Models Gauge Course of Argo Oil Spill

By John P. Hebert
Of the CW Staff

WASHINGTON, D.C. — Eight days after the oil tanker Argo Merchant became grounded off Nantucket Island on Dec. 15, computer simulations predicted less than a 5% chance that oil would foul New England beaches.

The U.S. Geological Survey and the Coast Guard rushed waiting computer models into operation to gauge the risks posed by the almost eight million gallons of industrial-weight oil carried by the Liberian-registered tanker.

Although the immediate danger has passed, the Survey, based in Reston, Va., is still using a model to predict the course and direction of the four to six million gallons of oil which leaked from the vessel when it broke up in stormy seas several days after it was grounded.

That model, originally developed to perform a worst-case oil spill risk analysis, was first run last September and October [CW, Oct. 25].

Three-Hour Updates

Using its dual IBM 370/155 CPUs, the Survey updates the model every three hours with fresh data on wind speed and direction from the U.S. Weather Service, according to Dick Smith, who heads the Survey's simulation effort.

The modelers use this updated information as a starting point in the simulation. "This improves the estimate of probability on the direction and speed of the spill, determining where it will go and when," Smith explained.

Survey personnel are also attempting to make extended predictions by estimating from the model how far from the wreck the main portion of the oil slick will be dispersed in 60-day periods.

"We estimate this main body of oil will be spread out over a 90-mile diameter area by the end of January and will increase to a 150-mile diameter patch by the end of February," Smith said.

The chance that oil will come ashore in the U.S. has diminished to "much less than 5%," he said. Smith did expect it to come ashore, however, in the British Isles or northern Europe, but warned that was only conjecture because there are no models covering the area east of Nova Scotia.

(Continued on Page 6)

COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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HIS Tops Off Level 6 Family

By Esther Surden
Of the CW Staff

BILLERICA, Mass. — The Model 6/43 introduced by Honeywell Information Systems, Inc. (HIS) here last week is the firm's top-of-the-line entry in its Series 60 Level 6 family.

Available in two memory versions, the system is said to be 30% to 60% faster than the 6/36 introduced last year; its performance range is comparable to that of Digital Equipment Corp.'s PDP-11/45 and the Data General Corp. Eclipse C/230, HIS claimed.

Designed for use in commercial and scientific applications by both end users and OEMs, the 6/43 is built around a single Megabus, as is the 6/36.

The 6/43 CPU can directly address 1M words of memory supported by 28 20-bit-long registers. The Megabus design provides 64 vectored interrupts and 20 traps for identifying system and program error conditions. The Megabus cycle time is 300 nsec, HIS said.

Users can optionally obtain memory management hardware which provides segmentation, read/write execute protection, base sector relocation and other functions.

Two Types of Memory

Two kinds of memory are available for the 6/43 — the NMOS single-word access version previously available on the Level 6 and an NMOS double word-access 32-bit version.

The 32-bit memory and controller provide users with the performance advantages of a 32-bit machine without the cost that goes along with following 32-bit technology throughout the machine, according to a spokesman. The memory's controller fetches two words at a time automatically in response to the CPU, he added.

A Scientific Instruction Processor (SIP) is also optionally available with the system. The SIP floating-point processor plugs directly into the Megabus and allows the 6/43 with the double word-access memory to run Fortran programs three times faster than the 6/36, the firm said.

The SIP provides 30 scientific instructions and performs either single- or double-precision arithmetic, the company explained.

As part of software enhancements to make the system more end user-oriented,

(Continued on Page 4)

Katzenbach, Justice in Huddle

IBM Antitrust Settlement in the Wind?

By E. Drake Lundell Jr.
Of the CW Staff

WASHINGTON, D.C. — A top IBM official huddled with the head of the Antitrust Division of the Justice Department here last week, apparently seeking to outline terms that might lead to a settlement of the government's eight-year-old antitrust suit against the firm.

At the same time the secret meeting was held, the four Cabinet appointees with IBM connections began undergoing questioning by the Senate on their qualifications for Cabinet posts.

The meeting, confirmed by Justice Department officials, was between Nicholas deB. Katzenbach, vice-president and general counsel for IBM, and Donald Baker, head of the Antitrust Division.

Held at the request of Katzenbach, the meeting was described by Justice Department sources as "a courtesy call" in which Katzenbach outlined IBM's position on the case to Baker and discussed its status as well as the present shape of the computer industry.

The sources did not say whether specific settlement terms were proposed or discussed.

While the discussion was probably of a general nature, sources here indicated most out-of-court settlements of antitrust cases usually begin with such discussion.

Although the meeting was described as a courtesy call to get acquainted with Justice officials, sources noted that Baker had been in charge of the division for over six months and that if Katzenbach had just wanted to drop by to say hello, he could have done so earlier.

The Justice Department may have found a successor to Raymond Carlson, the attorney heading the prosecution team in U.S. vs. IBM. See story on Page 4.

By describing IBM's view of the case and its probable outcome, Katzenbach probably outlined what IBM would like to see in any possible consent decree or out-of-court agreement, even if not in so many terms, the sources added.

This will allow Baker, who is reportedly staying on as head of the division until at least next summer under the Carter Administration, to be able to pass the word along to Attorney General-designate Grif-

(Continued on Page 4)

Florida Kills Tax on Software, Rules DP Programs 'Intangible'

By Nancy French
Of the CW Staff

MIAMI — The taxation of computer software as tangible personal property in this state was struck down by an administrative court here last month, largely on constitutional grounds.

In a case brought by Nova Computing Services, Inc. against Gov. Reubin O. Askew et al, the Florida Division of Administrative Hearings ruled Nova Computing sells "services" to its customers which are exempt from sales tax.

The only tangible personal property involved in the sale is the tape and cards that contain the data.

These goods are inconsequential to the sale because the information they contain could also be transmitted "orally or electronically without any tangible manifestation of transmission," according to the decision.

The consequential element involved in such transactions is data which is defined as intangible property and, therefore, not subject to the tax, Hearing Officer K.N. Ayers ruled.

In the suit, Nova Computing was fighting the state's right to assess it $26,225.67 in software sales tax which the firm should have collected between January 1973 and Nov. 30, 1975 [CW, Nov. 15].

Many states have been taxing software and data entry services under laws that authorize taxation of tangible personal property even though federal law considers such property intangible.

In the case of New York, state tax officials have decided to enforce a tax that would affect users and software vendors retroactively [CW, Nov.15].

In Florida, taxes were assessed on the value of the entire sale of a software package or service even though the only property that could be identified as tangible in such transactions was the punched cards

(Continued on Page 2)

NCR Mini, Micro Among Debuts Made on NRMA Convention Floor

By Toni Wiseman
Of the CW Staff

NEW YORK — Conference goers at the National Retail Merchants Association's (NRMA) annual convention here last week were treated to a look at a wide range of new point-of-sale products on the convention floor.

NCR was on hand with two system introductions and an upgrade to its operating software. The 8250 minicomputer system is NCR's latest offering and its first step into 19-in. rack-mounted peripherals.

Up to 128K bytes of memory and 20 million bytes of disk storage can be installed in a single highboy cabinet along with the processor, a magnetic tape cassette drive and interfacing logic for peripherals and terminals.

The 8250, with its MOS memory, can also run a remote batch communications application concurrently with interactive or batch applications in a multiprogramming environment, the vendor said.

Optional features include printers with speeds of up to 600 line/min, a second integrated disk controller, magnetic tape handler and single and dual flexible disk drives.

NRMA coverage continues on Page 8.

A standard configuration with 48K bytes of memory, 1 million bytes of disk, a 55 line/min matrix printer and one CRT costs $42,500 or $1,175/mo on full service rental.

NCR's 7200 Model VI is a free-standing desktop microcomputer programmed in

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NEWSPAPER

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AT&T Takes Waddy Ruling to High Court

By Ronald A. Frank
Of the CW Staff

WASHINGTON, D.C. — AT&T has asked the U.S. Supreme Court to review a lower court decision confirming the U.S. District Court's jurisdictional authority to hear the Justice Department's antitrust case against the Bell System.

The petition for review by the high court could introduce new delays into the two-year-old suit for two reasons.

First, Supreme Court cases of this type are normally handled by the U.S. Solicitor General, an office that to date has not been involved in the case.

Second, the person who will head that office has yet to be appointed by President-elect Jimmy Carter.

Late last year, Judge Joseph Waddy ruled the U.S. District Court had jurisdiction over the suit after this issue had first been raised by AT&T [CW, Dec. 13].

Waddy's ruling was handed down after careful consideration of whether the Federal Communications Commission or the U.S. courts should hear the antitrust suit.

Also considered was whether Waddy's court in the District of Columbia or the U.S. District Court in New Jersey (which heard the 1956 AT&T antitrust suit) should hear the case.

In asking for Supreme Court review, AT&T estimated the case will include a 10-year discovery period; would be "the most massive undertaking in the history of the American judicial system"; and could cost the Bell System and the government "in excess of $1 billion."

"These costs would be borne ultimately by the telephone consumer and the taxpayer, one and the same person," according to an AT&T spokesman.

Quick Review Unlikely

Although AT&T estimated the Supreme Court could give the petition for review expedited treatment and could resolve the issue by the end of its term in June, Washington legal sources last week considered this unlikely.

While an additional review would be considered "good judicial administration" at this point, one legal source said Waddy's opinion had not yet been ruled on in the U.S. Court of Appeals.

The high court could decide to await an appeals court review, he said.

Anticipating this legal problem, AT&T also filed its petition for review with the U.S. Court of Appeals for the District of Columbia.

Regardless of which court hears the AT&T petition, the position of the Justice Department will be presented by the incoming Solicitor General.

During Senate confirmation hearings last week, Attorney General-designate Griffin B. Bell told the Senate Judiciary Committee he was prepared to name Judge Wade H. McCree Jr. to the Solicitor General post.

The Justice Department's exact arguments in regard to this petition "will depend on who the new Solicitor General will be," one legal source said.

It is highly unlikely the high court will get to the AT&T petition before the end of its current term in June. If this is so, the matter would not be heard until the Supreme Court reconvenes in October, the source explained.

In addition, industry sources last week said it would be almost impossible for the discovery phase of the Justice Department suit to begin in March, as both parties had hoped after Waddy's recent ruling [CW, Jan. 10].

Florida Kills Tax on Software

(Continued from Page 1)

or paper tape that changed hands.

This "tangible" property was admittedly worth only about 5% of the value of the transaction, state officials said at the hearing.

Oddly enough, in cases where programs or data entered directly into the computer via CRT terminals or where computer tapes were used instead of cards or paper tape and then returned to their owner in a "reusable" state, no sales tax was assessed.

This was one of the flaws in the state's tax logic that was attacked by Nova Computing's president, Robert Sherin, who drew his defense from cases ranging from McCulloch vs. Maryland, heard in 1819, to a 1976 ruling of the Tennessee Supreme Court.

The Florida Cabinet has until this week to appeal the ruling, but, according to Assistant Attorney General Patricia S. Turner, who represented the state at the hearing, "it would not be a wise decision to appeal."

In 1819, Chief Justice John Marshall rendered a historic opinion establishing the supremacy of federal law over state law and state law over state agency rulings, Sherin told the hearing officer.

" 'The Constitution and the laws made in pursuance thereof are supreme,' according to Marshall's ruling," Sherin said. "They control the constitution and laws of the respective states and cannot be controlled by them."

The tax levied in Florida resulted in assessing Florida taxpayers for alleged tangible personal property "while depriving them of the benefits of electing to take a federal Investment Tax Credit and to depreciate their alleged tangible property" the way a firm could depreciate a building or a piece of equipment.

The reason for this is that the Federal Government "construes this property to be 'intangible' not 'tangible,' " Sherin added.

"Rulings in Florida cannot be inconsistent with federal rulings," he said.

In his ruling, the hearing officer reasoned the keypunch service Sherin sold was actually a service much like that performed by a court reporter who records and transcribes the proceedings in a trial.

Ayers also referred to another software case — Texas Instruments, Inc. vs. the U.S. government — which established that the Internal Revenue Code limits the federal Investment Tax Credit to "tangible personal property."

Here the court held that Texas Instruments was not entitled to take a tax credit for information on magnetic tape regardless of the investment that created it because the investment was in the information the magnetic tape contained, not the tape, and information is intangible.

Ayers also cited Commerce Union Bank vs. George M. Tidwell, the commissioner of revenue for the State of Tennessee, which also involved the taxation of computer software as tangible personal property [CW, Nov. 15].

Tennessee law defines tangible personal property as property which may be seen, weighed, measured, felt or touched or is in any other manner perceptible to the senses, Ayers said.

Here the court distinguished between computer software and motion picture film or phonograph records which the court had previously determined were tangible personal property.

The difference, the court held, was that without the film or phonograph record there would be no movie or music.

By comparison, software can be transmitted orally or electronically without the tape or cards on which it is contained. It is merely incidental that these intangibles are transmitted by way of a tangible reel of tape.

Sherin's assessment of $26,225.67 in software sales tax was also ordered expunged.

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HEAT

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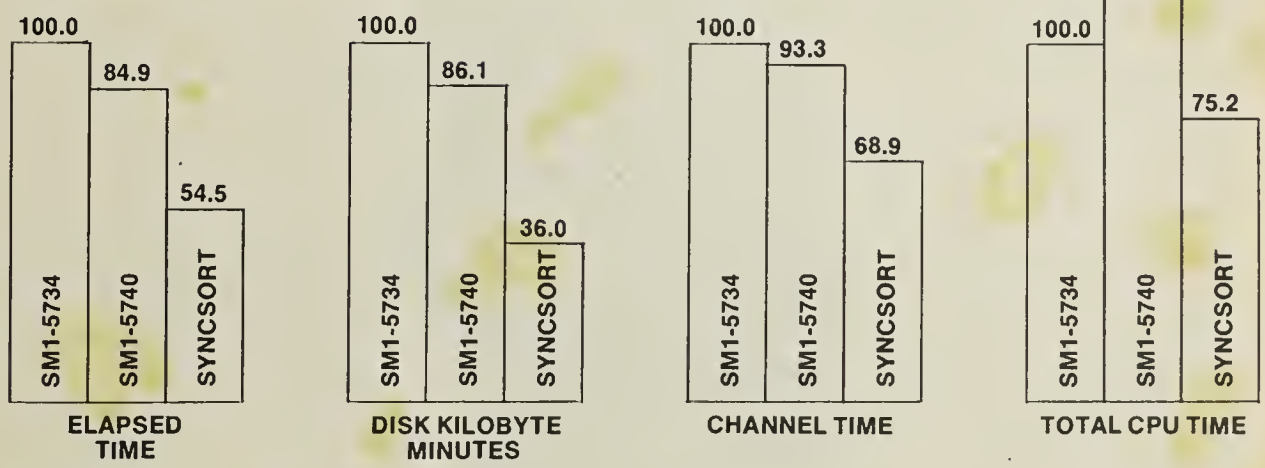

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None of these obvious advantages of SyncSort were lost on previous IBM sort users. Consequently, we've been enjoying a very high rate of conversion to our product. (IBM should be so lucky in converting its hardware users to new operating systems.)

Is there hope for ICEMAN? Well, it's going to take a lot of cold weather. Maybe the Computer Giant will have to follow the practice used by certain ski-resort operators.

Call in an Indian tribe to hold a snow dance.

WHITLOW

COMPUTER SYSTEMS Inc. 560 Sylvan Ave., Englewood Cliffs, N.J. 07632

IBM, Justice Parley Sparks Talk of Suit Settlement

(Continued from Page 1)

fin Bell who, if he decides to settle the case, will know the IBM terms and conditions, the sources said.

The timing of the visit, with a new Administration coming in this week, was "very interesting," they noted.

Spokesmen for Bell last week indicated he, along with others, was "studying the case" that is currently being carried on by the department he will head if he is confirmed by the Senate as expected.

Settling the Case

In many ways, the new Administration would probably like to settle the suit in order to free manpower and funds devoted to the case for other projects, other sources noted.

An incoming administration, the sources said, does not receive much credit for finishing up a case that has been pursued by a previous administration. A new administration would probably prefer to devote its resources to cases of its own choosing.

This is particularly true when an incoming regime represents a different political party, they noted.

Presently, almost 10% of the Antitrust Division's resources are devoted to the IBM case.

The U.S. suit against IBM was filed on the last working day of the Johnson Administration, eight years ago today. It has been pursued since then under the Republican administrations of Nixon and Ford.

IBM has often taken the position that the case is without factual basis and that it just penalizes the firm for being successful, ideas most likely emphasized by Katzenbach in his discussion with Baker.

In addition, the firm has noted the case is eight years old and claimed the industry has changed significantly over that time, obviating the need, if there ever was one, for the government action.

The industry is getting more competitive all the time, IBM claimed. It also has said its share of the market is declining — again making the government position out of date in the reality of today.

Asked about the meeting, an IBM spokesman said "we're not going to comment."

Senate Hearings

While that meeting was going on, the Senate began confirmation hearings on four Cabinet nominees with IBM ties.

The Senate heard testimony from Patricia Harris, an IBM director designated to be Secretary of Housing and Urban Development; Cyrus Vance, an IBM director nominated to be Secretary of State; and Harold Brown, an IBM director designated to be Secretary of Defense.

In addition, testimony was heard from Griffin Bell, the nominee for Attorney General who is a partner in the law firm of King and Spalding, a firm currently representing IBM on a "routine commercial matter" [CW, Dec. 27-Jan. 3].

Staal in Line for Carlson's Job?

WASHINGTON, D.C. — If U.S. vs. IBM is not settled, Robert Staal, a veteran of over 10 years in the Department of Justice's Antitrust Division, has an inside track to replace Raymond Carlson as the chief government lawyer on the case, reliable sources reported here last week.

Staal, who is currently in the department's San Francisco office, visited the trial team recently in New York and returned here last week for discussions with ranking officials in the division.

Carlson is eligible for retirement in November and is expected to take advantage of that opportunity if the government has finished presenting its side of the case by then.

The department has been looking for several months for a possible successor to handle the case while IBM presents its defense. Apparently, it has come up with a lawyer from within its ranks.

While department sources indicated discussions were going on with Staal, they would not say when or if he will be named to the post officially.

HIS Extends Level 6 With Model 6/43

(Continued from Page 1)

HIS added the GCOS6/MDT disk-based operating system that is said to provide executive, file management and communications facilities in a multiprogramming environment.

The firm also announced a Level 62-compatible Report Program Generator for the Level 6 and reportedly enhanced its Cobol compiler to support Isam, 9-track magnetic tape and 120 char./sec printer activities.

Peripherals announced included 7- and 9-track, 45- and 75 in./sec magnetic tape units and a 120 char./sec printer. A 960-character, 12-line CRT with removable keyboard was also announced.

A typical 6/43 with 96K words of memory, SIP, 10M-byte cartridge disk, magnetic tape drive, 300 line/min printer, eight CRTs and the GCOS6/MDT program development software costs "less than $80,000," HIS said. It will be available next month.

The GCOS6/MDT executive costs $800; a sort capability for both the executive and the previously announced BES/2 operating system is priced at $200. RPG costs $2,200.

Prices for the magnetic tape devices begin at $7,000 with the controller costing $3,000. The printer is priced at $2,750 while the CRT costs $1,400, HIS said from 200 Smith St., Waltham, Mass. 02154.

Model 6/43

Solving business problems is our business.

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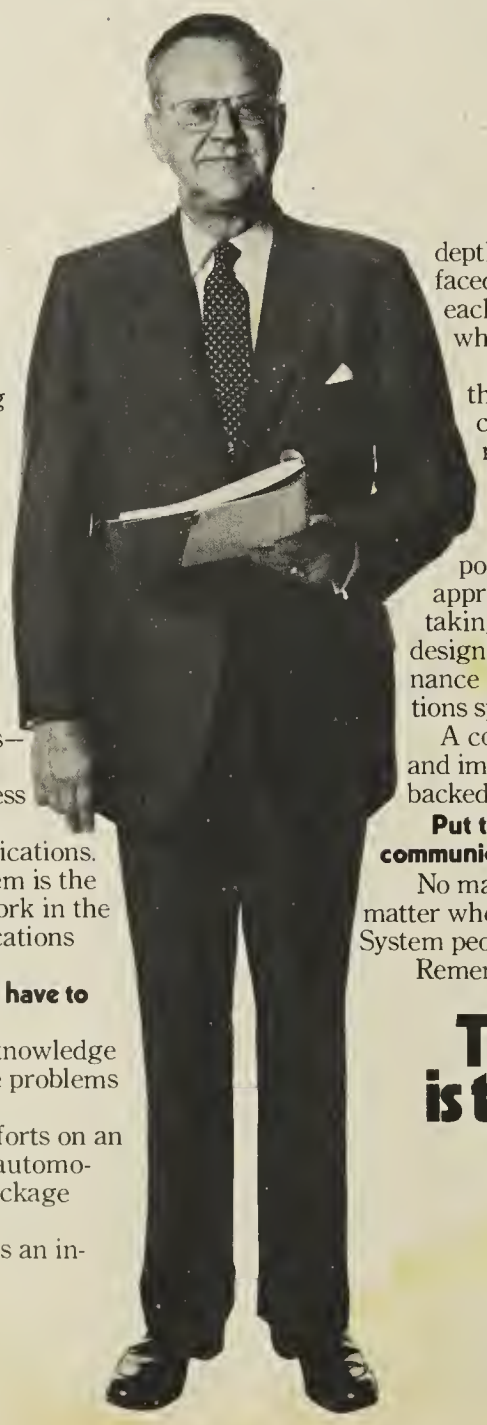

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Perhaps the single most important part of the Bell System's approach to problem solving is taking total responsibility for the design, supply, installation, maintenance and repair of your communications system.

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Put the resources of the world's largest communications company to work for you.

No matter what business you're in. No matter where you're located. There are Bell System people ready to meet your needs.

Remember, if you have a problem:

The system is the solution.

Bell System

In-Depth Privacy Study Concludes

DP Health Data Files More Secure Than Paper Records

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. — Computerized health records are more secure today than their counterparts in paper files, according to an in-depth study of privacy in medical recordkeeping and health care released here last week.

And record leaks or misuse of medical information occur largely in manual record systems because the most sensitive health data is still stored and transferred in paper files, the study found.

However, automated systems in the health care field are far from trouble-free. Health data systems are being created today that many health professionals, citizen groups and individuals affected by such systems consider to be threats to basic rights, the report said.

Sponsored by the National Bureau of Standards (NBS) Institute for Computer Sciences and Technology, the two-year study was directed by Alan F. Westin, professor of public law and government at Columbia University.

Timely Study

From Westin's viewpoint, the 401-page report, entitled "Computers, Health Records and Citizen Rights," is especially timely for three reasons: the incoming Carter Administration's interest in national health insurance programs; the increasing use of computers in health care; and the current debate over the individual's right to control the use of his personal health data.

The report looks at the current methods of recordkeeping and the rules governing citizens' rights in health organizations. It describes how computers are being used and their effects on personal recordkeeping. It also identifies policy alternatives that might safeguard citizens' rights as health data systems are created and become more prominent.

"Most computerized health data systems are being created or expanded without sufficient consultation in advance with groups representing citizens' rights and doctor-patient interests and without some kind of proceeding open to the general public," the study stated.

Few health data systems analyzed how much and what kind of identifiable personal data they really need to perform their functions, Westin discovered.

In addition, very few computerized organizations have adopted procedures for patients to have access to their own records.

"What we have today are ambiguous and ill-defined systems that leave people uncertain and fearful about their capacity to control the circulation of their medical and health data," Westin said.

Between the summer of 1974 and April 1976, Westin and his team of researchers compared the impact of computer use in "primary health care," at physicians' offices, hospitals, clinics and health units of institutions like colleges, corporations and the military.

They also focused on the computer's role in the payment of medical services, in quality-of-care reviews and in social applications involving health data, such as employment procedures, life insurance and welfare applications, law enforcement and child-buse programs.

"Traditional laws and organizational policies have not kept pace with the new flows and uses of health information throughout our society," the study revealed.

"Standards to resolve the growing policy debates are lacking in many sectors of the national health care systems.

"This leaves computer systems developers in health care without clear policies to guide the automation of files and assemblage of data systems," it continued.

Overall, computerization in health care hasn't been as extensive as it has in banking, law enforcement and taxation, although the report noted automation in the field is growing in use and sophistication.

Some believe rising health costs and the prospect of national health insurance will serve as the impetus to a rapid development of computerized systems in this area, according to Westin.

However, his study concluded that expansion of computer use for hospital information systems isn't imminent. This is because conceptual models of such systems that are cost-effective and acceptable to the health profession and to the public don't yet exist, Westin explained.

The study profiled six organizations involved in automating personal health records to examine how organizational policies and computerization efforts are affecting citizens' rights.

These inquiries indicated the development of computing and communication at health organizations "is still essentially a matter of organization artistry, not management science."

While some new laws are helping to determine how citizens' rights will be treated in health systems, the study concluded that the real decision making in this area continues to rest with health organization management.

HIS Sets Workshops On Security Problems

PHOENIX — Security and privacy problems associated with DP networks and distributed information systems will be emphasized in a new series of workshops here sponsored by Honeywell Information Systems, Inc. (HIS).

The three-day workshops — scheduled for Jan. 25-27, Feb. 15-17, March 22-24 and May 10-12 — will feature case studies, team analysis, guest speakers and special sessions devoted to actual abuses of computer security or privacy.

Emphasis will be placed on developing methods to prevent security and privacy violations, according to Jerome Lobel, HIS security manager and workshop organizer. Efforts to legislate computer security at the state and federal levels will also be discussed, he said.

Registration for each workshop is $350, which includes course materials. Further information is available from Lobel at HIS, P.O. Box 6000, Phoenix, Ariz. 85005.

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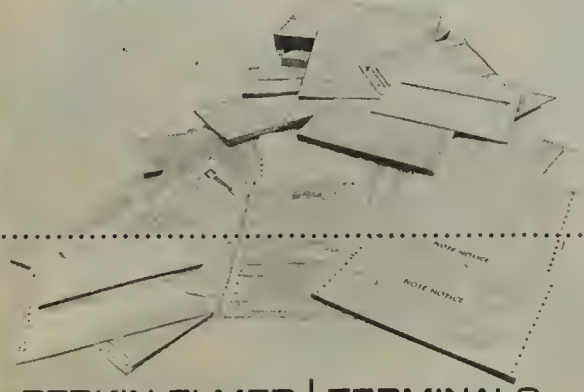

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Request for Proposal No. 277 for the purchase of a DEC model DC10B asynchronous communication port expanders.

Request for Proposal No. 278 for the purchase of a programmable electronic calculator.

Detailed specifications may be obtained from the CDPA office. The CDPA reserves the right to reject any and all bids and proposals and to waive informalities.

Clyde P. Ballard, Executive Director
Central Data Processing Authority

DP Plotting Helps Coast Guard In Search for Missing Tanker

By John P. Hebert
Of the CW Staff

BOSTON — While efforts continued earlier this month to predict the course of the Argo Merchant's spilled oil cargo, the U.S. Coast Guard brought its Computer-Assisted Search Planning (Casp) efforts into play to help locate the missing Grand Zenith.

When the Panamanian-registered tanker, with its cargo of eight million gallons of industrial oil, was last heard from on Dec. 29, the ship's officer reported the tanker was dropping speed because of heavy seas off Nova Scotia's southern tip, a Coast Guard spokesman said.

Although life jackets from the ship were picked up by a joint U.S.-Canadian search party, attempts to find the Zenith were called off last week. The tanker is presumed to have broken up and sunk in heavy seas.

The search for the Zenith was guided by computer and manual plots of the 200- by 170-mile-corridor from Massachusetts' Cape Cod to Nova Scotia, according to George Watts, assistant branch chief of the Coast Guard's Search and Rescue (SAR) Coordination Center here.

A team of five computer programmers and another five analysts and project managers in the New York City-based SAR Amver Center plotted the most likely area of the tanker's location using wind, weather and last-known location data — and a "set of standard Control Data Corp. peripherals" tied to a CDC 3300 mainframe in Washington, D.C., according to Lt. Cmdr. John Hanna, chief of that center's analysis branch.

Unexpected Dump

The search for the missing tanker was hampered in its first week when the Amver Center accidentally "dumped all of the input data" compiled for the mission, Boston SAR's Watts said.

The Boston center was "up to its ears with the Grand Zenith," Watts said, because the New York program dump "happened at the worst possible time." The accidental dumping was an unusual incident, he quickly added.

The effects of wind and ocean currents on ships or planes lost at sea usually can be calculated by the computer system in about one hour, including all input and turnaround time between Boston, New York and Washington, a Boston SAR staff member said.

The program dump delayed the search four or five hours because the Boston staff was forced to manually calculate the weather and current factors, he said.

The Amver Center receives all transit information about merchant ships, including cargo, flag, course and location destination and cargo, Hanna said. From that data, files are maintained on the system and updated on a regular basis to be used for identification, rescue efforts and other needs.

Models Gauge Path Of Argo Oil Spill

(Continued from Page 1)

The Survey has received data on the Gulf Stream and North Atlantic currents to reliably predict the spill's course in the coming months, Smith said last week.

The Coast Guard had computer simulation programs on-line before the Argo Merchant went aground. After the grounding, it provided a printout every 12 hours predicting where the surface oil slick would be, according to Lt. David Frydenlund, head of the Coast Guard's Oceanographic Unit of Computer Operations for Search and Rescue here.

The Coast Guard model not only receives updates on tides, wind and ocean currents, but also uses data from periodic overflights of the entire slick.

Generating the forecast requires one to two hours of turnaround time on the Coast Guard's Control Data Corp. 3300 CPU here.

The Coast Guard utilizes the model because of a "primary responsibility, by law, to protect the navigable waters of the U.S. However, we usually end up trying to protect the beaches," Frydenlund said.

The simulations are also performed to answer the question of how to cope with the spill from the Argo Merchant because of the probability that the Merchant's spill is not the last in a series, he added.

There will be daily updates for several months until the spill threat is ended. "There is no textbook solution to the type of spill the Argo Merchant presents," Frydenlund said.

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NCR Mini, Micro Among Systems Shown for First Time

(Continued from Page 1)

NCR's Basic Plus 6 (Extended Basic). Scheduled for delivery during this quarter, soon-to-be-announced peripherals for the system include a 30 char./sec thermal printer, 132 char./sec matrix printer and bisynchronous communications capabilities.

A standard configuration including the control/display unit, keyboard, single cassette recorder, 24K of memory (19K for Basic, 5K user-programmable) and the software license fee cost $6,995. The unit is not being put out on rental.

NCR also announced the upgrade of its operating systems to Imos III, designed for transaction-driven applications running in multiprogramming environments.

Imos III allows any user-specified terminal to initiate a background job to be run with its regular applications processing when the background task does not require access to the terminal for output.

Stand-Alone Intelligence

Data Terminal Systems unveiled its DTS-510 terminal with full stand-alone intelligence. The 510, which is said to be fully user-programmable, will be released as the 540 later this year for the supermarket industry.

The terminal features an inter-register communications option and transmits POS data over phone lines in standard bisynchronous discipline to the host computer, essentially eliminating the backroom operation, according to the vendor.

General Instrument Corp. showed two additions to its Unitote/Regitel Series 400 POS system, the 425A and 430A. The 425A features an interactive keyboard with prompter display while the 430A intelligent terminal guides the salesperson through each transaction by sequential lighting of keyboard action keys.

The 430A also offers full stand-alone capability; both terminals feature a user-programmable alphanumeric display option designed to expand the versatility of the interactive system.

General Instrument also introduced a "concept" with the availability of a small CRT peripheral to the terminals for such look-up applications as bridal registery and big-ticket items. The data base is updated automatically after each sale and operates off the excess storage capacity of the backroom minicomputer.

TRW announced the availability of the Model 2805 data collector and forwarding device, designed to provide the communications link between a small number of POS terminals in a typical specialty store with the chain's central computer, thereby eliminating the need for a controller.

CW At NRMA

Datatrol introduced the RS-6100 POS system which features a store-level communications controller that is said to support any combination of up to 90 POS or credit authorization terminals.

In addition, the RS-6100 offers a minicomputer-based central processor.

Prices for the controller range from $15,950 to $20,450. The 6100 uses high-level languages and has greater capacity to handle more disk drives in printers and other peripherals than its predecessor, the RS-6000, Datatrol said.

Datatrol also exhibited the FT-32, a self-supporting terminal system that contains a built-in modem for communicating with a central credit authorization computer. It also contains a microcomputer to control and monitor clerical functions at the point of sale.

Finally, IBM demonstrated 3650 enhancements. The latest features include the 3767 printer keyboard for hard-copy output, an enhancement for the 3657 ticket unit for all-ticket capability and a mass merchandizer keyboard for the 3653 POS terminal.

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Consumer Acceptance Predicted

EFT Concept Seen Evolving Into Reality in Next Decade

By Toni Wiseman
Of the CW Staff

NEW YORK — Electronic funds transfer (EFT) is not a single concept or phenomenon which can be looked at like automating accounts receivable. Rather, it is an evolutionary process which will take another decade to become total reality, attendees of the National Retail Merchants Association (NRMA) annual convention were told here last week.

While the industry is well aware of the contentions over EFT, one important question remains: Why would a consumer ever choose to instantaneously debit his bank account through EFT when he can get a two-day float by writing a check or a 30-day float by using a credit card? Blair Shick, senior consultant for Arthur D. Little, Inc., asked.

Focusing "on the forest and not the trees" Shick said it appears the industry will be dealing with two evolutionary stages before arriving at the point where the volume of transactions and social changes will effectively herald the arrival of EFT.

CW At NRMA

"The evidence is convincing that, within [the first] five-year period, the networks will indeed be built and subsystems will emerge as an embryonic national system," he stated.

During the 1982-1987 period, the volumes will begin to take off and the industry will witness the evolution of the multifunction transaction card, he predicted.

Impetus for EFT

Taking a closer look at the coming decade, Shick noted several factors which are providing impetus for EFT.

First, the technology necessary to implement EFT networks is available today, although system refinements are inevitable, he noted.

Check and credit losses as well as efficiencies and cost savings are further reasons for promoting EFT development, as is increasing competition between financial institutions, retail organizations and credit card companies, he said.

Finally, there is the actual cost of the physical locations. Banks want to put as many outlets as possible as close to the consumer as they can, Shick pointed out. The cost differential between the "brick-and-mortar" office and an EFT terminal speaks for itself, he said.

Effects at POS Level

On the other hand, there are several factors affecting the point-of-sale (POS) development of EFT, such as the existence of other EFT systems (automated clearinghouses, automated teller machines) and authorization/verification systems.

Competitive offerings from financial institutions will certainly affect the spread of EFT services offered by retailing entities at the point of sale, he said.

Consumer sophistication or adaptation is also a factor to be reckoned with, he said. And, finally, the resolution of regulatory problems is negatively affecting POS development, he stated.

These key regulatory issues include the question of off-premise installations and, in particular, liberalizing branch banking restriction, Shick said.

Also at issue are interest-bearing demand accounts which, he said, are the basis for the transaction account which will evolve with full EFT systems.

Equalizing lending powers — allowing savings and loan institutions, for instance, to issue credit cards — will also have a definite effect, he said, and there is still the issue of the confidentiality of financial records.

Consumers Accepting Idea

Shick noted progress is apparent in consumer acceptance. Consumers accept the existence of credit authorization terminals, for instance, and preauthorized services such as automatic Social Security check deposits are slowly making inroads.

Each experience impacts another and builds the sum of the total environment, leading the consumer to accept the next level of progression, Shick said. For example, consumers are being indoctrinated with the idea that the government wouldn't use direct deposit unless it worked; it therefore carries the "Good Housekeeping Seal of Approval," which paves the way for direct deposit of paychecks, he said.

There are currently about 4,500 banking terminals installed across the country but, as consumer acceptance increases, so will the number of terminals, Shick stated, estimating 10,000 to 12,000 terminals by 1980.

By 1982, the multipurpose transaction card will appear as a synergy of all past consumer experiences, he predicted, as the consumer becomes aware of its benefits.

Consumers will be faced with a choice between EFT and the paper systems by 1981 or 1982. As he begins to see the changes in cost per transaction with interest-bearing transaction accounts, however, the consumer will move to increased use of the debit cards, Shick forecast.

Bank Teller Assailed By Cardless Client

DORAVILLE, Ga. — A loyal bank employee here withstood physical assault recently, all in the line of duty.

John Hulme, an irate bank customer, attacked and beat the teller when she refused to give him back his bank card. The teller was identified only as "Tillie," the *Rivertown Times* reported.

Tillie "suffered internal damage" after Hulme began hammering away at her with a heavy instrument, according to police reports.

Hulme was charged with felonious criminal damage. Tillie's recuperation from the vicious attack will reportedly cost more than $1,000.

Tillie, the automated teller machine, has refused to comment on the incident.

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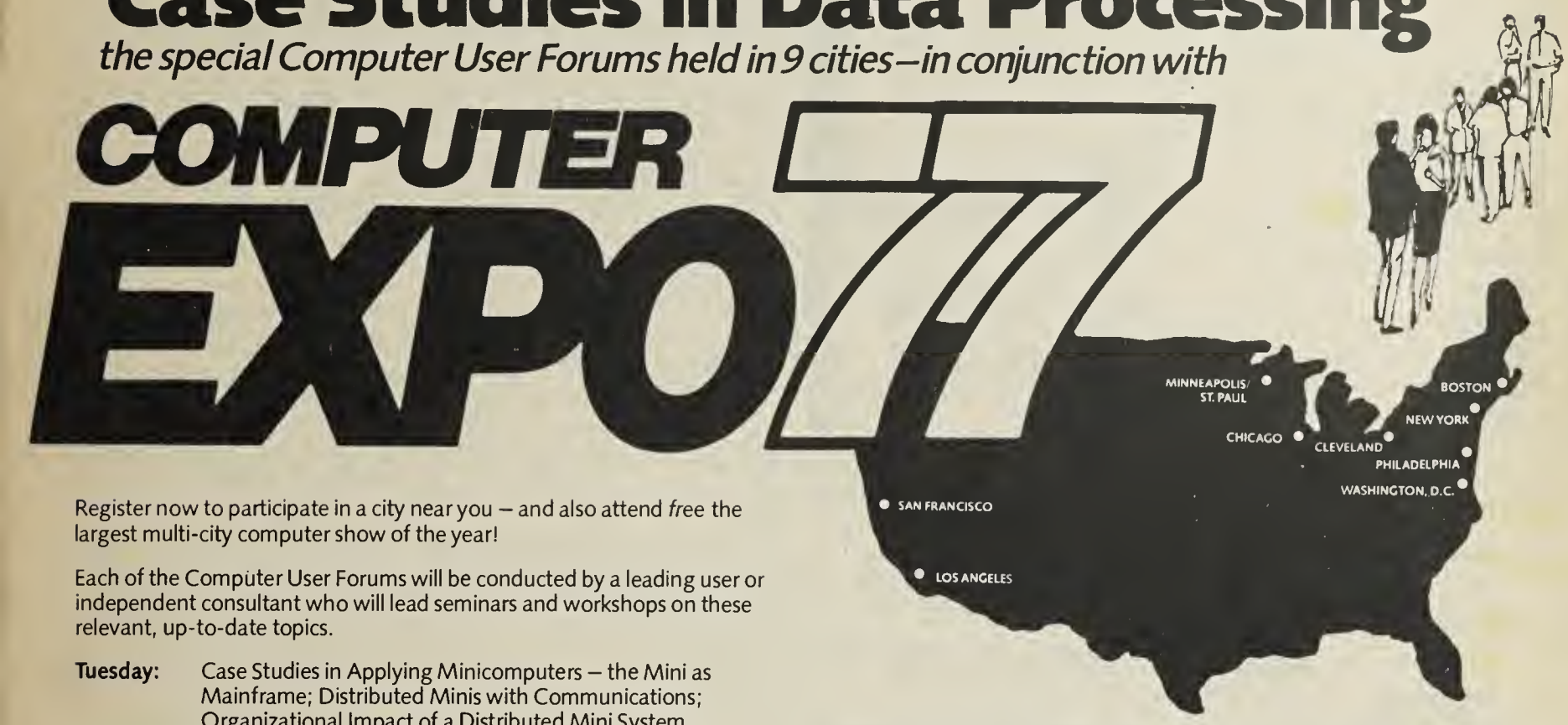

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Feb. 6-9, Los Angeles — **1977 Western Workshops and Exhibits of the International Security Conference**. Contact: Executive Director, International Security Conference, 2639 S. La Cienega Blvd., Los Angeles, Calif. 90034.

Feb. 7-9, N. Hollywood, Calif. — **1977 Winter Convention on Aerospace and Electronic Systems (Wincon '77)**. Contact: C.A. Christofferson, Wincon '77, 5500 Canoga Ave., Woodland Hills, Calif. 91364.

Feb. 7-11, Chicago — **World Fair for Technology Exchange**. Contact: E. Bailey Prine, Dr. Dvorkovitz & Associates, P.O. Box 1748, Ormond Beach, Fla. 32074.

Feb. 7-9, Washington, D.C. — **Life Cycle Management for ADP Systems**, sponsored by the American Institute of Industrial Engineers (AIIE). Contact: Diane Summers, Dept. PR, AIIE Seminars, P.O. Box 3727, Santa Monica, Calif. 90403.

Feb. 8-9, Washington, D.C. — **Federal DP Expo '77**. Contact: Robert E. Harar, Marketing Ventures, Inc., 5012 Herzel Place, Beltsville, Md. 20705.

Feb. 9-10, Peoria, Ill. — **Geometric Modeling and Automated Process Planning**, sponsored by Computer-Aided Manufacturing-International (CAM-I). Contact: C.H. Link, Executive Secretary and General Manager, Suite 1107, CAM-I, 611 Ryan Plaza Drive, Arlington, Texas 76012.

Feb. 10, Baltimore, Md. — **Data Processing Day**, sponsored by the Data Processing Management Association. Contact: J. William Yox, Publicity Chairman, c/o Arundel Center, MS-1, Annapolis, Md. 21404.

Feb. 13-16, Atlanta — **1977 Bank Telecommunications Workshop**, sponsored by the Operations and Automation Division of the American Bankers Association (ABA). Contact: Constance Williams, Operations & Automation Division, ABA, 1120 Connecticut Ave. N.W., Washington, D.C. 20036.

Feb. 14-16, San Francisco — **Minicomputer Applications Conference**, sponsored by the American Institute of Industrial Engineers (AIIE). Contact: Diane Summers, Dept. PR, AIIE Seminars, P.O. Box 3727, Santa Monica, Calif. 90403.

Feb. 14-18, New York — **Fundamentals of Finance & Accounting for Non-Financial Executives**, sponsored by the American Management Associations. Contact: Patrick Daly, Program Director, AMA, American Management Associations Building, 135 W. 50th St., New York, N.Y. 10020.

Feb. 16-18, Philadelphia — **IEEE Solid-State Circuits Council (ISSCC '77)**. Contact: Lewis Winner, 152 W. 42nd St., New York, N.Y. 10036.

Feb. 21-24, Orlando, Fla. — **Operational Data Security Workshop**, sponsored by the University of Kentucky. Contact: Operational Data Security Corp., 6 Swarthmore Lane, Dix Hills, N.Y. 11746.

Feb. 24-25, Sturbridge, Mass. — **New England Computer Users Group**. Contact: Stephen L. Priest, Brockton Hospital, 680 Center St., Brockton, Mass. 02402.

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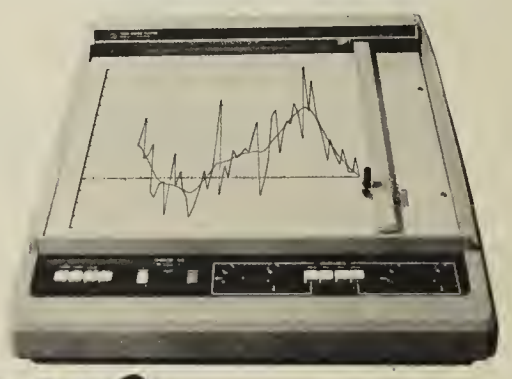

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MIT Program to Allow Students To 'Attend' DP Class Remotely

By Ann Dooley
Of the CW Staff

CAMBRIDGE, Mass. — An MIT-sponsored program will bring the classroom to computer and electronics employees and enable them to earn graduate-level credits during their working hours.

Scheduled to be given in the spring term, which begins in February, the Tutored Video Instruction (TVI) program will videotape each regular MIT graduate class session. Classes usually meet three times a week.

The videotape will be reproduced at MIT and distributed, usually the next day, to companies which have signed up for that particular class.

Initially the TVI program will offer only one computer course, "Semantic Theory for Computer Systems."

Because the program concept is still being tested this semester, the course offering is limited. Much interest in computers has been shown, so there will probably be a wider range of courses offered later, according to John Newcomb, assistant director of the MIT Center for Advanced Engineering Study.

The employees taking the course will meet at their plants or offices with the same frequency as the graduate students on campus, view the same lecture, have access to the same printed material, complete the same homework assignments and compete with on-campus students for grades, Newcomb explained.

Tutor to Help

The industry workers will watch the tapes with a tutor, usually a company employee who knows something about the subject and who is trained to lead discussions and clarify the subject matter.

The tutor will visit the campus for preparation before presentation of the course.

The advantage of being able to stop tapes to discuss or answer questions is that it adapts the pace of the presentation to the needs of the learner; it improves the performance of those students who are in a continuing education program, especially if they are rusty or slow to learn, according to Dr. Myron Tribus, director of the center.

TVI has been found most effective when three to five students watch the video tapes, so MIT has limited the number of people in a group to seven. If more than that number enroll at any one company, additional groups will be formed.

Students in industry can enroll in the program as listeners, special students or degree students.

Listeners watch the tapes but do no homework and do not receive a grade. Special students are those studying to earn credits but not working for an MIT degree. Degree students are those who have been accepted by a department for study toward an advanced degree.

Since MIT requires a thesis for an advanced degree, a limiting factor is the number of thesis candidates who can be properly supervised at any one time.

Israeli Official Asks Data Bank on Citizens

NEW YORK — Israel's computers can't talk to each other yet and, for reasons of economy and efficiency, Amiram Sivan, director of that country's National Insurance Institute, would like to change that.

According to the *American Zionist*, published here, the Israeli government has 40 large computers, each operated independently.

Each department writes down the name, address, date of birth, identity card number and other statistics about people who apply for services, converts it to machine-readable form on cards or magnetic tape and enters the data into its systems.

Since many people deal with several government agencies, the same information about the same people must be processed 10 to 20 times, all at the expense of the Israeli taxpayer.

Possible Solution

Sivan believes a national data base accessible to all the computers of the Israeli government would solve that problem.

Each computer system could draw information as needed and add information that becomes necessary.

As for the fears expressed by some that such a system might violate individual privacy rights, Sivan said the data base could be limited to only the information about each citizen which is already included in their voter registration, which is open to public inspection.

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DP Helps Recruit, Place Physicians In Rural Areas

By Ann Dooley
Of the CW Staff

SALT LAKE CITY, Utah — A program designed to match doctors with medical practices in rural mountain areas has begun to emphasize the personal approach because of the lack of success in earlier computer matches, according to officials.

Since 1974, the Physician Placement Program here has used a Univac 1108 to recruit, match and place physicians in areas which normally lack medical care.

The computer match was only moderately successful because of its limitations in weighing the importance of personal factors and its inability to correlate the ambiguous answers given by both the physicians and the regions, according to Dr. Richard Kirk, project director.

Now, the computer is used just in the first step of the winnowing-out process, Kirk said.

Communities receive the names of the first six doctors on the list and the doctors receive a similar list of communities. Then personal interviews and tours are arranged so that each party can find out about the other.

Modifying Questionnaire

The questionnaire also is being changed to include more social and cultural aspects important to both groups.

The program is set up so that interested physicians fill out the 100-question computer form as do communities requiring medical personnel.

The questionnaires include a number of criteria including social, cultural and medical background information.

The communities answer questions about their physical aspects, including geography, demographics and economy; what kind of medical care is currently available; and their cultural and social characteristics, such as the dominant religion, the mix of people and their acceptance of outsiders.

The data is then tabulated to match as closely as possible the needs of both parties.

Since the program began in 1972, the ratio of applicants has remained fairly static with 200 rural communities requiring doctors and 100 physicians looking for that kind of environment, according to Kirk.

Problem Causes

There were several reasons for the system's lack of success in matching applicants, Kirk said. One reason is that it simply lacked the human element.

Another problem was that only a limited kind of information was put down on the forms. Communities might not want to admit they encourage one kind of person or religious preference over another, when in actual practice they do, Kirk said.

"We will continue using the computer match as part of the process because of the high volume of information to be processed," he added.

The program, which has placed about 40 doctors, is funded by the Department of Health, Education and Welfare through the University of Utah.

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Editorial

The Carter Cabinet

President-elect Jimmy Carter has chosen three members of the IBM board of directors and one member of the board of directors of Western Electric (an AT&T subsidiary) for Cabinet posts at a time when both of those firms are being sued by the government on charges of monopolization.

In addition, he has chosen a man whose law firm works for IBM to be Attorney General.

In many ways, this attests to the high caliber of people who are attracted to the boards of these two corporations. Individually, they are talented and energetic and would appear to be the type of people who would make excellent Cabinet appointees. They surely will be confirmed by the Senate, which started hearings on their qualifications last week.

But on another level the choices are disturbing.

All of the board members involved work for companies that the U.S. Department of Justice alleges are guilty of monopolistic practices. If the department proves those charges, that will mean each of these four serves on the boards of directors of companies engaged in breaking the law of the land.

Directors are supposed to oversee the activities of the corporations they serve. However, it is not clear that any of these board members has actively questioned whether the company he serves is a monopolist, guilty of illegal activities.

So, if the charges are true, we may end up with four Cabinet members who once served on the boards of corporations actively engaged in breaking the law. While antitrust is not viewed by many as being as serious as robbery or assault, it is still against the law and a serious offense.

As Griffin Bell undergoes hearings before the U.S. Senate on his confirmation as Attorney General, it is to be hoped that any ties to IBM will be fully explored.

If Bell becomes the leading government "trustbuster," his partnership in the Atlanta law firm of King and Spalding must be totally severed.

There are some critics who pointed out that minor credit and collections cases handled by Bell's law cronies for IBM are a far cry from serious conflict of interest regarding the Justice Department's antitrust suit.

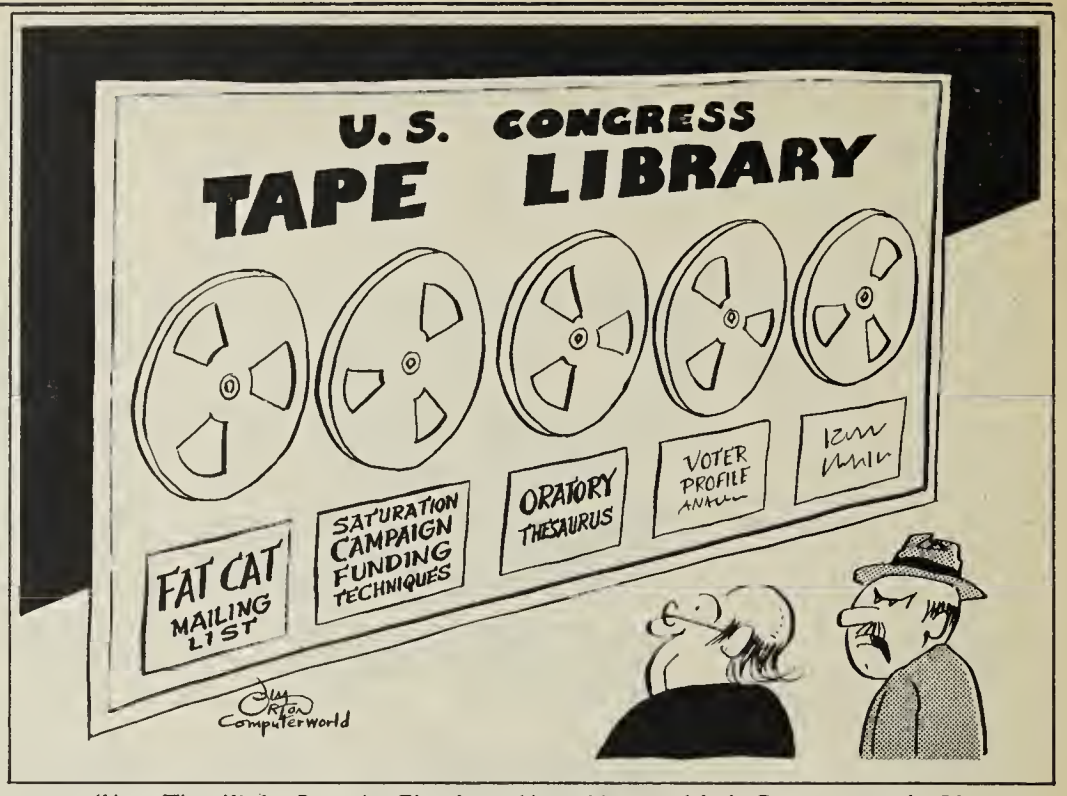
But if Bell were to throttle the Justice Department's vigorous pursuit of the antitrust case, it would obviously work to the benefit of the corporation.

More importantly, it would make a mockery of the long, intensive months spent by the nonpolitical antitrust staff in Justice to prosecute this case.

This is not the time to condemn Bell unfairly. It is an important issue and it should be objectively disposed of by the Senate. The process of advise and consent should include a fair examination of all pertinent issues on an equal basis.

The people will, of course, give up all connection with the firms when they take office. But will they want to actively pursue their former benefactors and will they create a climate where vigorous actions against those benefactors can take place?

It seems unlikely.



'Now That We're Past the Elections, How About a Little Reprogramming?'

Letters to the Editor

Coverage of Carter's Cabinet Informative But Questionable

The lead article in the Dec. 27-Jan. 3 issue ["Carter's Attorney General Choice Tied to IBM"], while informative as to the backgrounds of some of the President-elect's administrative team, was rather oblique as to any other meaning.

It has been a long-standing practice of Presidents to select people of stature in the business community to serve in the Cabinet or other high-ranking positions.

Since no conclusion was drawn in the article as to the merits of having such individuals serve with the government, I am at a loss to understand the reason you chose to "headline" the matter.

Having been a user of other vendors' computer equipment for some years and, therefore, having no particular bent toward IBM, I found this article a rather tepid, boring part of what appears to be a *Computerworld* policy of rather unfounded inferences that IBM is somehow controlling the computer industry, the government and any other arena into which it delves.

Perhaps the visibility of IBM-associated people in government and business circles is a reflection of their individual talents rather than the conspiratorial atmosphere you seem to present.

James L. Healy
New York, N.Y.

Brown's Order Lacks Controls

I cannot find fault with Gov. Jerry Brown's rationale that privacy is "fundamental" by virtue of the California Constitution ["Brown Again Nixes Calif. Privacy Law," CW, Dec. 13]. By initiative ballot in 1972, the citizens overwhelmingly voted to affirm such a fundamental right.

What is disturbing about Brown's substitution of an executive order, which is supposed to protect the citizen's privacy and guarantee the right to petition for redress of grievance, is that the executive order apparently does not establish any functioning mechanics to prevent or expose misuse or mishandling of information.

Bureaucrats and politicians alike are not apt to pay much heed to such an executive order, not necessarily with malice, but through simple ignorance or preoccupation with primary functions. Such is the "nature of the beast" which is at the heart of the problem and is the more frightening aspect.

Brown is not being his proclaimed pragmatic self if he believes that by this stroke of his pen he is accomplishing privacy guarantees that work.

As a matter of fact, as I interpret this, one's right to privacy is not exercised until it is shown to have been violated.

Perhaps, as a practical matter, privacy as an issue is not pressing. But the sad and bad thing about the privacy matter is that as each day goes by, the erosion of our anonymity accelerates.

Thomas E. O'Connor
Ben Lomond, Calif.

Searching for a Basic Version

We are looking for a version of Basic or Basic-like language (Mumps, etc.) with data base or at least random file access capabilities running on a Digital Equipment Corp. PDP-8E under OS8.

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Data Past

Five Years Ago
Jan. 19, 1972

WHITE PLAINS, N.Y. — IBM announced that DOS support for its 360 line was to end and future enhancements of DOS would be directed toward the 370. It said DOS Release 27, scheduled for the end of May 1972, would be the first DOS release to operate exclusively on the newer line of CPUs.

— — —

WASHINGTON, D.C. — AT&T rejected the Federal Communications Commission's (FCC) request to modify its interconnection tariff requirements. The Independent Data Communications Manufacturers Association told the FCC that Bell's interconnection policies were discriminatory.

AT&T refused to comply on grounds that the FCC would place "undue emphasis on the need to promote competition for the benefit of a few suppliers."

Eight Years Ago
Jan. 22, 1969

NEW YORK — Cobol-to-PL/I conversion appeared to be a near-reality for OS/360 users — at least according to an IBM document dated Dec. 16, 1968, which was received by several people.

The people who received the document then received a follow-up letter apologizing for the "inconvenience it may have caused" and requested its return.

An error occurred when a "functionary" of IBM attached the wrong mailing list to the job slip for circulation, according to an IBM spokesman.

— —

WASHINGTON, D.C. — AT&T announced it would release details of the specific tariff revisions it was prepared to make, according to Bernard Strassburg, chief of the Federal Communications Commission's (FCC) Common Carrier Bureau.

The tariffs were filed by AT&T following the FCC's June decision that the existing "foreign attachments" tariffs were unlawful.

Growth Opportunities Limited

Top of Operations Ladder Frustrating to Key Personnel

By Jack Stone
Special to Computerworld

One of the recent trends found in the larger DP installations is the movement toward planning and implementation of career development programs for DP technical personnel. The concentration of activity has been on the systems analysts and programmers, who have historically received the primary attention of management in the allocation of personnel development resources.

Operations personnel, generally characterized as "non-professional" in the industry — in spite of their abilities to get the work out the door under usually difficult circumstances — have universally received the short end of the development stick.

To illustrate the situation that exists in operations, I interviewed Mary Jo Blair, a shift supervisor with a large-scale 370/168 installation in Washington, D.C. If the reader wants to learn the secret of how to drive away experienced, productive and loyal computer room supervisors, just use the formula prescribed by Mary Jo's installation.

Q. Mary Jo, how long have you been involved in DP?

A. Well, I started in 1958 as an EAM operator and worked in the peripheral equipment processing area until 1967, when our installation obtained its first computer. I then operated the 360 equipment, staying with the upgrades as they occurred, and worked with the 30, 40, 50 and 65. I was promoted to assistant shift supervisor in 1971 and soon after was working with the 370/145.

I was promoted to shift supervisor in 1973 and have stayed in this position as our installation upgraded to our current 370/168.

Q. And what is the general structure of your installation?

A. We have a 4M-byte mainframe supported by OS/VS2 with TSO, RJE and Hasp. Our installation serves as an internal "service bureau" within the U.S. Department of Agriculture.

Q. What are your regular duties at your installation?

A. We have an average of about 12 people per shift who handle all the operations functions: scheduling, console, tape/disk handling, library (about 29,000 tapes and 180 mountable disk packs), JCL assistance, etc. We handle all customer support in the operations area, which is quite challenging since the bulk of our workload is on-line.

Q. Do you have special responsibilities delegated to you?

A. I think we are very fortunate in having assignments for management tasks that I don't believe are common to other installations. We are viewed as more or less at the branch chief level and participate in staff meetings, financial planning, personnel administration and similar activities.

Q. Do the operations personnel have specific assignments?

A. They do, but they are all cross-trained so practically all of them can perform reasonably well at any job.

Q. The cross-training must have involved a rather substantial effort.

A. Well, yes, it has over the years, but the payoff is there. We have had some turnover as of late, and the training has eased the transition. I should say that our management is very strong on operator training and, as a matter of fact, based on my four years as the Guide project manager on operator training, I am currently on a temporary assignment to plan and implement upgrade training programs for all of our people.

The Human Connection

Q. With the responsibilities, training opportunities and 168 technology, your job appears to be a real winner.

A. Well, not really, no. I'm afraid that all of us operations supervisors have come to the end of our careers. There are no higher level grades available to us as computer operators. There are no future salary increases available either, except to compensate in part for cost-of-living increases (in-grade increases).

Frankly, there is no significant challenge left in the job of computer superivsor because there is nothing to strive for in the job — no new job goal to work toward.

I continue to work hard to maintain good performance ratings, but this is not enough. I feel that I am completely competent in my job and, as most people feel, I want to move higher in the organization in my chosen career of machine operations.

It would be a lot better if there were another level above, even one where the qualifications may be very difficult to attain. At least I could find another challenge to work harder — much harder — and try to achieve a difficult goal.

Q. If, in fact, you are at the top of the operations ladder, have you considered changing your career by transferring to another area?

A. This is practically impossible in my organization, because only trainees are accepted in almost all situations.

Q. Are there possibilities for training for other careers that are made available to operations personnel?

A. Not really. Essentially all of our training is oriented to the current operations job.

Q. I hate to bring it up but, in spite of nearly 20 years of service with your organization, have you thought about leaving?

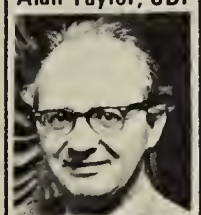
A. Most definitely, yes. Quite frankly, I feel that I have too great an interest and capability to be satisfied with what I consider to be a repressive environment. I have done some initial explorations, but I just haven't had the time to pursue the matter aggressively.

Q. It sure appears that growth opportunities for the computer operations supervisor in your installation are very limited. Fortunately, your high-level grade and ongoing salary should compensate in some measure for the lack of growth.

A. Well, you'd think so. Unfortunately, a general downgrade in job classification was recently announced for all operations personnel. As an incumbent, my grade and salary are protected but nobody can tell me for how long.

Management's Lack of Time the Cause of MIS Failures

The Taylor Report
By
Alan Taylor, CDP



Top-level management does *not*, in fact, operate the way it says or even the way it thinks it does. That is the surprising result not of one, but of many independent studies that have been performed recently.

In fact, top-level management has hardly any time to really consider new projects or deeply concentrate on specific subjects. The average top-flight executive has been observed to have less than one 35-minute-long session a week to get down to such concentrated thinking.

The researchers suggest this lack of time — which was previously unappreciated — is the reason why many management information system (MIS) failures have occurred. They have a point. If the executive hasn't time to use an MIS as more than a big set of file drawers, then the real use is not going to occur.

And, if the system is not really used, then it is a failure, even though it does everything the glossy specifications say it will do.

However, it appears to me there is a much greater problem facing DP as a result of the research findings than this comment on MIS failure, and that problem extends to most DP areas and is not just restricted to MIS operations.

Basically, what is being said is that management is not really reviewing things in their true complexity — even when they have been presented with the full complexity. Clearly, the pattern of actual MIS use practically precludes any deep complex appreciation.

Management must then be working selectively — choosing between alternatives whose complexities have, hopefully, already been appreciated by someone else.

Such selectivity is all very well when there are people around who do appreciate the complexities and are prepared to provide such predigestion before letting top management get hold of a job. And it may also work where there are ways to test out the claims involved before having to make a commitment to some course of action, or where management is intrinsically up-to-date and fully informed about the subject matter.

But where these items are not present, then undigested complex material had better beware. Mistakes may occur early and not in the implementation area, but instead in the understanding.

DP is a complex matter and requires just the type of detailed consideration that management cannot give to anything — even though it thinks it can. And, of course, only management itself can really review management information systems, for they are the future users of them.

If, as now appears, management doesn't have the time available it thinks it has and has really delegated downward the task of ensuring that complex subjects have been properly thought through before being broached, there is a much easier explanation for the reported failures of MIS than the one the researchers reported.

Under such unappreciated circumstances, the causes of failure would not only come from management's lack of time to use the MIS — it would also come from the fact that management does not have time to properly review the presented specifications.

So the error may be really the result of undigested specs, no matter how well they were implemented. And that is the real danger, DP-wise.

It is almost inevitable that pioneering DP projects are complex and are presented to top management for consideration with many complexities still left to management evaluation. It is also true that DP, by its nature, cannot be tried before considerable commitment has been made. Yet, further, few are able to keep up-to-date in the DP field *and* become top executives.

So — for DP in general and not just MIS operations — this means the major shield that protected the basic approval of complex DP projects has been found to be just a falsehood. Management may be needed to approve DP projects,but the record is that it really does not have the chance to do so!

What can a DPer do about the situation? Well, as I see it, he must simply recognize the situation and realize he is on his own.

He might try breaking management's job into two parts, first asking it to recognize the implications (which now will have to be worked out, and prioritized from a negative point of view) right in the DP department before presenting any complex system for review. Or he might break up a project into smaller bits rather than attempting to do too much at once. The possibilities are almost endless.

But something must be tried, because it is now clear our old stand-by "user requests" as the reason for DP failures simply isn't proper when it comes to information management.

We know now — something many of us have believed for a long time — that most "user requests" and "user approvals" are simply too easily given to cover a decent study of consideration.

And without a proper study from somewhere, not biased toward the project, the whole thing can be a technical tour de force — and still a box-office failure.

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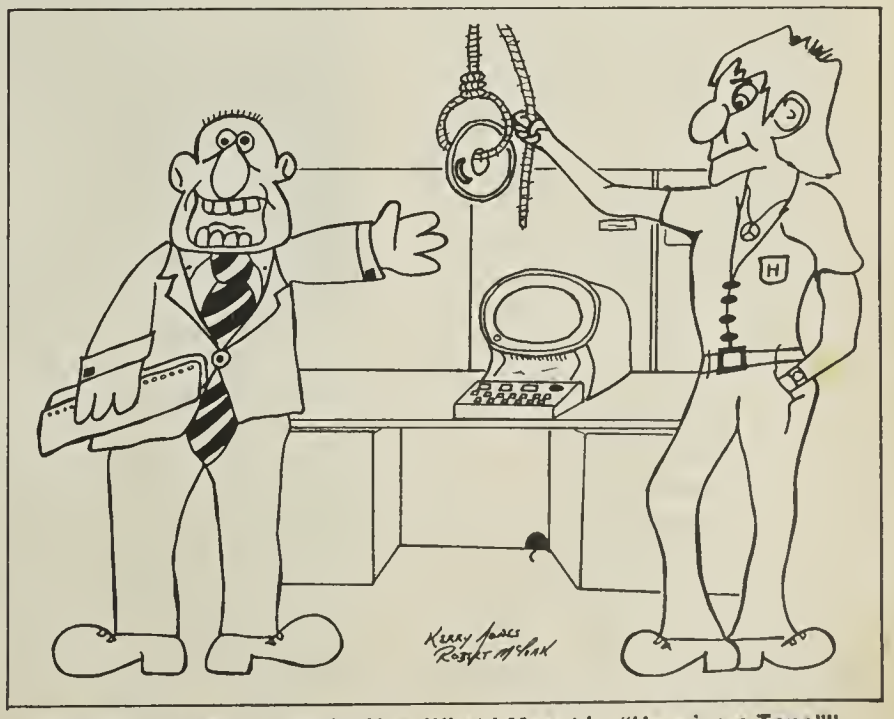

'You'd Think He'd Know by Now What I Meant by "Hanging a Tape"!'

Locks Don't Deter Professionals

Cryptography Urged as Practical Means of Security

By James R. Kitchen
Special to Computerworld

Today, with the proliferation and abundance of highly sophisticated electronic equipment coupled with the guidance of the rating-happy media (which teaches today's youth how to commit various crimes from petty larceny to grand theft with only a few hours of selective viewing), a knowledgeable person can penetrate and compromise any facility from almost any location, either remote or local.

The hegemonic middle and upper managements believe a barred door will keep the bogeyman away. These restraints may be tantamount to security checks or physical barriers.

But, as any law enforcement officer will tell you, a locked door may keep out the amateur, but it won't keep out the professional thief.

Professionals Not Deterred

The amateurs or radicals may be deterred by a well-developed bulwark such as solid doors, card locks and security personnel with guard dog. However, professional thieves will consider them routine and proceed with the appropriate counteraction.

These professionals are capable of bypassing alarm systems, finding and tapping the facility's data links, bribing or coercing employees and of writing programs which can bypass any software restraints. It would be no problem for a group with this level of expertise to breach a facility and remove, copy or exchange data files.

There are two possible ways to discourage the professional thief. The first is to move all valuable data to a secure location such as a bank vault or a crypt. Although this would be perfection from a security officer's point of view, management of a system with this constraint could prove to be both costly and time-consuming.

Cryptographic Approach

The second approach is to use cryptography. A simple, inexpensive routine that can, by transfiguration, modulate the data to the extent that it is nonrecognizable may be implemented by any facility.

The data, once converted, could then be written onto the files or transmitted over the data link where it could be reconverted to its original form.

The routine can be a simple bit reversal or a complex multilevel algorithm depending on the internal requirements of the facility. The program should be modular in form and coded as an integral nonlabeled step within the system. This would prevent the routine's label from being written to the system library and utilized by unauthorized personnel.

The Human Connection

The module must be capable of converting the data to nonnormalized characters and back to its original form. This would greatly reduce any attempt to obtain data outside the standard job streams with its in-line checks and system constraints.

Alleviates Fear

With a cryptographic routine in place, management fears of theft or fraud can be alleviated and credence can be given to statements dealing with security. Once this brick is placed on the security wall, the only other items the facility manager should worry about are natural disasters (fire, flood and earthquake), deliberate interference (acts of war, sabotage and work stoppage) and others (loss of programs and damage to equipment).

These problems can and must be anticipated so the destructive potential is minimized.

Kitchen, a consultant for the past 12 years, is presently with the State of South Carolina.

Letters to The Editor

Most Cases of DP Fraud Originate in User Shops

For several years now our external auditor, in his annual letter to management, has recommended that we discontinue the practice of permitting programmers to conduct unsupervised testing on the computer because it would "permit the unintentional or intentional alteration of programs or files without the possibility of detection."

Every week we make four check runs in support of four different applications. In each case, the run is edited and balanced to predetermined user totals and a check register is printed.

It is my sincere opinion that the danger of undetected fraud is far greater in the user organizations where records are created and source documents are produced for balancing than it is in DP where any tampering would surely result in out-of-balance conditions.

It is my further opinion that most cases of "fraudulent use of the computer" originate in the user shops and not in the computer room. And yet, I never see any recommendations from the auditors to tighten the controls over creation of source documents.

William T. Ziegler
Annapolis, Md.

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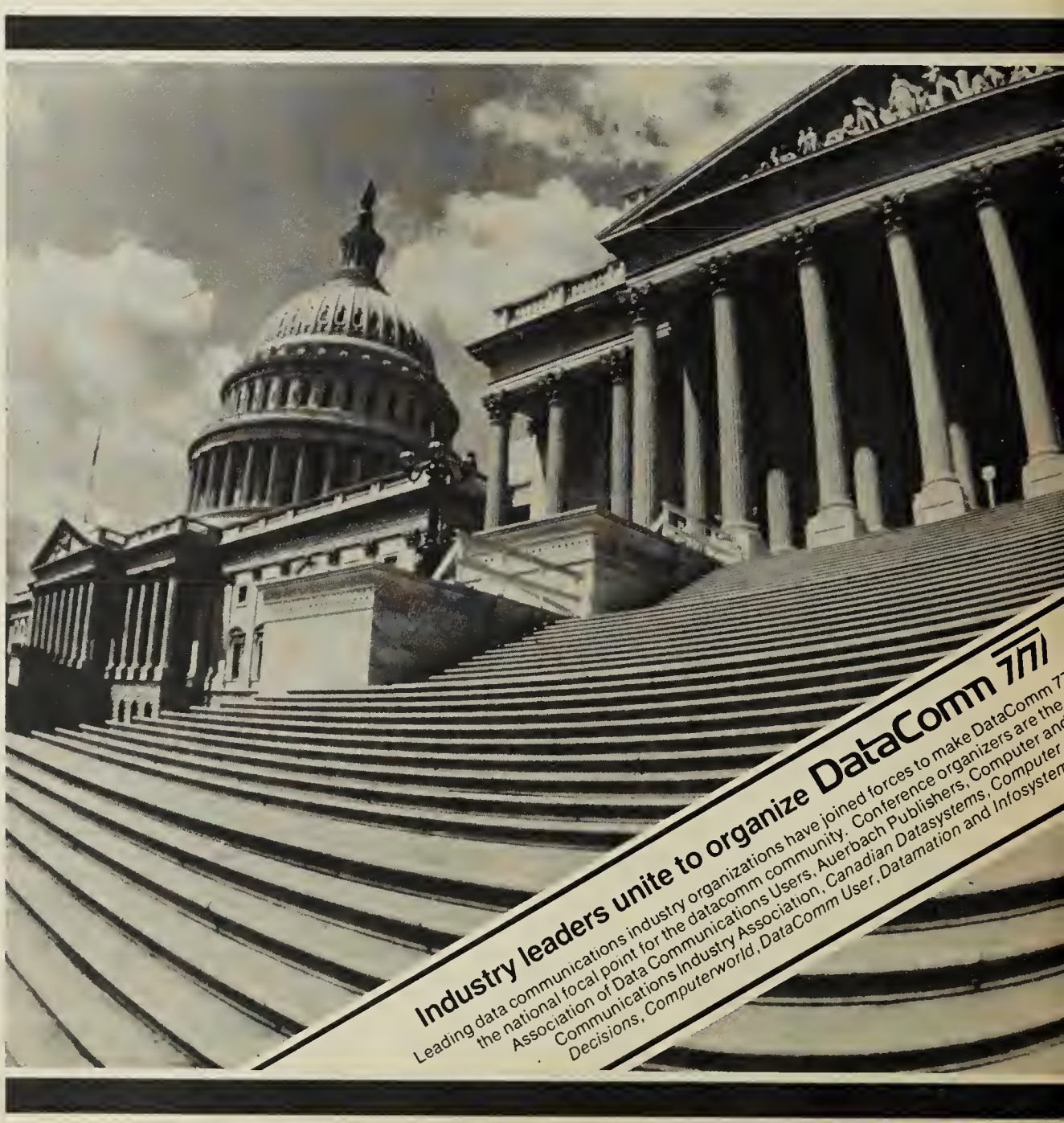

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FAA Air Traffic Control System: Rush to Automation?

By Kenniston W. Lord Jr.
Special to Computerworld

It was my privilege recently to cross the country along with a "dead-heading" pilot from a major U.S. airline. During the trip we discussed the problems which have been experienced by pilots and air traffic control personnel vis-a-vis computer system outages.

Of course, computer system outages are largely transparent to the aircrews on duty above Flight Level 18, or 18,000 feet. It may not be immediately apparent from the instruments but, according to my companion, it's indicative of the kinds of problems the whole air network is experiencing.

It appears that in their rush to computerize the skies, the Federal Aviation Administration's (FAA) wizards overlooked a number of critical aspects of air control. To paraphrase the words of my companion, they removed the judgment from the pilot-in-command in the cockpit and invested it in the hands of the ground assembly, ranging from the semiskilled computer programmer to the ulcer-prone air traffic controller.

In the shift, the lives of several million people have been placed in jeopardy.

To begin with, much data which could effectively be telemetered to automated traffic control radar stations is required by the FAA to be relayed via radio and is therefore subject to crowded airspace and misunderstanding.

Having finally received such data, the controller is required to go through a lengthy process of keyboard data entry. This data entry process requires considerable manual skills and dexterity.

The result of all this keyboard entry is that the controller is forced to remove his eyes from the screen, or radarscope, in order to execute function or free-form commands to the computer system.

This can then mean that two "blips," representing aircraft, might not be noticed on a collision course until too late, especially when shifted from radar sector to radar sector.

. . . And in This Corner

The shift to another radar sector is a manual operation in the midst of an otherwise highly automated ground operation. It is done simply via the telephone.

The pilot with whom I traveled told of repeated attempts to establish radio contact with ground controllers, only to discover that he was unable to answer because of the lengthy process of manual sector change. Thus, the ultimate Achilles' heel of the entire air traffic control process could theoretically get well out of hand in the required process of manually dialing the telephone.

And when two aircraft are headed on a collision course, each at 500 miles per hour, the entire flying public is at peril.

Another Problem

Computer-generated enhancement of aircraft identification data presents yet another problem. The characters displayed on the screen are large enough and sufficiently luminated to negate or obliterate the radar-echoed "skin" image, that image returned by the metal of the aircraft itself.

Thus, under close proximity, surveillance is virtually impossible.

To further complicate matters, on-board proximity-warning computer systems are not yet required by the FAA, though they are currently available. Like any other business, the airline industry will not invest in that form of equipment until absolutely forced to do so.

The problem continues inside the cockpit. Under Instrument Flight Rules (IFR), the pilot is required to monitor and report to the controllers items which are available for readout on the instrument panel.

To observe the instrument panels on any of the available jet aircraft, both the pilot and his first officer are required to remove their eyes from the window of the cockpit to fix them on the instruments. In a final approach under 1,000 feet and moving at a speed of at least 200 miles per hour, this is not only tricky but highly dangerous.

So what we have is the total investiture of command decision in automated ground control in a computerized system which FAA acknowledges is radically less than perfect. Assuming that the system has been constructed carefully and tested thoroughly — which it has not — one is left to wonder just whatever happened to safety in the rush to automate.

There is no doubt that automation of the air traffic control system is a practical necessity, but one wonders why more care has not been exercised and why controllers must be saddled with extensive and patently dangerous keyboard entry and other manual "shift-off" procedures.

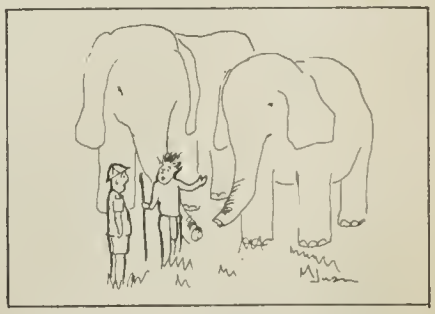
Further, on-board instrumentation exits which can present critical data to be displayed on the aircraft windows, permitting the command pilot to keep his eyes outside the cockpit while reading the instruments.

What price tag can be given to the value of a human life, or, for that matter, a planeload of human lives?

Here, then, is the paradox. In the rush to place control on the ground, the FAA has presented a system which is by far faster and more efficient, as is necessary, but at the same time more cumbersome and patently dangerous.

In the cockpit, where the final life-or-death decisions rest, the necessary automation has been slighted.

Therefore, as I ride from coast to coast, I'm reminded of the story of the old math professor during the aircraft bomb scares. While I will continue to fly, I'll have to continue to place my trust in the pilot and the aircraft, both of which have been licensed and certified against mandatory and legally enforceable standards, and none at all in the computer system which controls and tracks our progress, a computer system which has received the benefits of neither licensing nor certification and for which there are no standards whatsoever.



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Surprising Results Often Come From Writing of User's Guides

By Diana Patterson
Special to Computerworld

One technical writer told me he has never written a user's guide that didn't make a change in the organization that used it. I've written quite a few user's guides and I've found this is usually true.

What, might you ask, could possibly be changed by the writing of a user's guide? Easy. Almost anything.

Organizations have a way of working according to rather amorphous rules unless things are so highly structured that corporate standards are enforced to tell you when to visit the washroom. DP departments are frequently exempt from strict codes simply because they have always seemed to be doing something mysterious that requires late-night machine time and the hiring of strange beings called systems programmers who will quit on you if you ask them to wear ties.

Good systems people are hard to find, so they are given a good deal of freedom.

A user's guide usually becomes a functional specification for a DP department. It allocates responsibility because it has to say where a user gets his problem solved and who will give him a pad of coding forms.

Programmers, rather than managers, are the source for this kind of information. The guide must say how it really works, not how managers believe it works or wish it worked. The idea is to see the world from the user's view.

Reader Commentary

Once the way things really work is written down and passed around for approval, inefficiencies, inconsistencies and downright communication gaps are glaringly obvious. One recent example I can cite is the case of the unappreciated keypunch department.

When putting together a user's guide for a very large company, the powers that be told each manager to contribute a section relating to his department. The systems people didn't contribute anything. The user services group handed in a string hodgepodge, some good stuff, some junk and a lot missing. The keypunch group contributed a 30-page essay on the design of coding forms.

The coding form design material was totally out of proportion to its need; only two or three people a year might have occasion to look at such an essay.

But the keypunch manager had been so harassed by the misuse of coding forms and the mistreatment of his staff that he had painstakingly constructed rules for avoiding these problems. If the user's guide hadn't been commissioned, his problems probably would have been ignored.

I vetoed the inclusion of his essay on design in the user's guide because bulky user's guides are neither read nor carried to terminals/keypunches. I did suggest that it be made into a small document available on request from someone and that the user's guide state it was available and from whom.

It took a lot of debate among the managers to decide who would be responsible. In the end, the keypunch manager was chosen since he could then update it as his personnel and equipment made that necessary. This meant the keypunch department could control its own work in a way it hadn't been able to do before.

There have been some truly shocking examples of organizational flaws uncovered by user documents. The most notable in my experience was the discovery of basic design flaws in a Fortran compiler I was documenting for a large computer company.

Ignoring all market research, the compiler designers had left out many features and still made their optimized compiler 10 times less efficient than their major competitor. Since the competitor had the slowest optimizer then known, this flaw was significant.

When the documents brought this to light there was only minor consternation

Organizing information for a user's guide means structure must be imposed. If a department manager doesn't like that structure, it may mean the department — not the table of contents — needs some rearranging.

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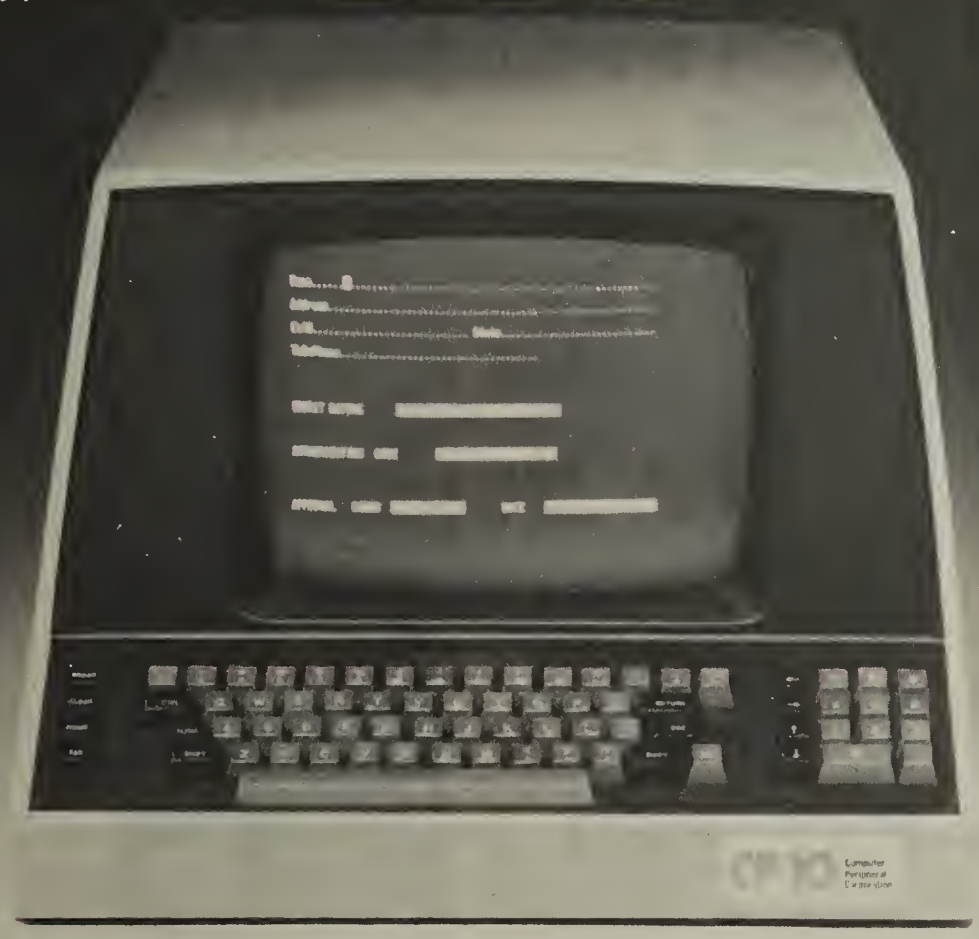

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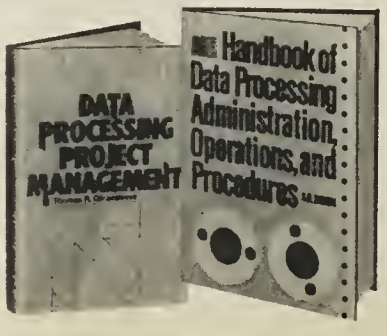

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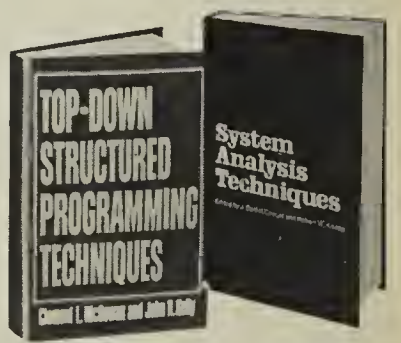

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School Days

Systems Analysis Workshop Set for D.C. Next Week

BETHESDA, Md. — Brandon Systems Institute, Inc. has revised the curriculum of its "Systems Analysis Workshop" and scheduled half a dozen presentations of the five-day course during the first half of the year.

The workshop will be held in Washington, D.C., next week; in New York City in mid-February; Atlanta, early March; Chicago, mid-April; Philadelphia, mid-May; and Kansas City in mid-June.

The course costs $650, the registrar said from 4720 Montgomery Lane, Bethesda, Md. 20014.

Wharton Offers Sessions On Business Fundamentals

NEW YORK — DP managers may gain insight into the dollars and sense of their organizations by attending one of the three-day seminars offered this year by the Wharton School of the University of Pennsylvania.

Titled "Fundamentals of Finance and Accounting for the Non-Financial Executive," the seminars will be given in Houston later this month; in San Francisco in early February; in Atlanta in mid-February; in New York in early March; and in Phoenix in mid-March.

Cost of the course is $495 per person plus $50 for each organization. Detailed information is available from the Wharton Registrar, New York Management Center, 360 Lexington Ave., New York, N.Y. 10017.

DP Project Management Theme of Seminar Series

CHICAGO — The University of Chicago Center for Continuing Education has scheduled presentations of a three-day seminar on "Project Management for Computer Systems" in four different cities early this year.

The course will be given in Houston in early March; New York in late March; Los Angeles in mid-April; and here in Chicago in early June.

The registration fee is $395/person plus $50 for each organization represented, the spokesman said from 1307 E. 60th St., Chicago, Ill. 60637.

Datapro Reports

Users Put 38 Packages on Honor Roll

By Don Leavitt
Of the CW Staff

DELRAN, N.J. — Thirty-eight packages received high ratings from users surveyed recently by Datapro Research Corp. and were placed on its 1976 Software Honor Roll.

Each of the packages was rated excellent in the key category of overall satisfaction and good in a series of specific characteristics.

"The number of truly high quality software packages in widespread use has increased dramatically during the past year," Datapro said.

The latest honor roll is 50% longer than the one compiled in 1975, when 25 packages were listed. This increase occurred even though the criteria were the same in both years, according to a report published by Datapro last month.

Seven of the packages on this year's honor roll have been on the list four consecutive years, ever since it was established by Datapro in 1973.

In this elite group are Alltax from Management Science America; Disk Utility System, Westinghouse Electric Corp.; DYL-250, Dylakor Software Systems, Inc.; Epat and Grasp, Software Design, Inc.; The Librarian, Applied Data Research, Inc.; and Panvalet, Pansophic Systems, Inc.

Another five of this year's honored packages have been on the list for three years. This part of the list included Fast/Dump/Restore from Innovation Data Processing, Inc.; Optimizer II, Capex Corp.; RPG-II (for 360/370), IBM; Syncsort, Whitlow Computer Systems, Inc.; and UCC 1, University Computing Corp.

Appearing on the honor roll for the second year are Asap and Relo-Plus from Universal Software, Inc.; 1130/Fortran and 1130/Sort, both from DNA Systems, Inc.; IMSL Subroutine Libraries, IMSL, Inc.; the Teleprocessing Interface System (Westi), Westinghouse Electric Corp.; and Watfiv, University of Waterloo in Canada.

First-Time Winners

First-time winners start with CA-Sort II from Computer Associates, Inc.; Cytos, DNA Systems, Inc.; Dfast and Tfast, both from Oxford Software Corp.; Diopen, IBM; Diskplay, Boole & Babbage, Inc.; DYL-260, Dylakor Software Systems, Inc.; and Easytrieve, Pansophic Systems, Inc.

Others are Fmaint from Software Design, Inc.; IDMS, Cullinane Corp.; Image, Hewlett-Packard Co.; Look, Applied Data

(Continued on Page 24)

Eclipse Cobol Brings Control To DP for Arizona Health Plan

BLOOMFIELD, Conn. — CG Medical Programs, Inc. (CGMP), a subsidiary of Connecticut General Life Insurance Co., became one of the first users of Data General's (DG) Cobol late last year.

It transferred the DP workload required by its Arizona Health Plan (AHP) activity from a number of outside service centers to an in-house Eclipse C/300 located in Phoenix.

CGMP estimated the changes made to its DP operations, including the purchase of DG equipment, resulted in a reduction of monthly costs to one-third of the projected expenditures for the current level of activity supported at the AHP.

AHP is a 35,000-member health maintenance organization (HMO) which handles 500 to 600 patient visits per day. Member data and visit-related data as well as business and accounting functions are performed using the DG computer equipment as one of the key support elements.

Before switching to the in-house system, CGMP data processing was fragmented among service bureaus, time-sharing services and a packaged patient records and appointment scheduling system at the Phoenix facility. The operations involved over 350 Cobol programs, all developed by CGMP.

These systems handled a variety of processing applications including revenue collections; claim processing; accounting functions for receivables, payables, payroll, budgeting and general ledger; inventory; appointments; laboratory tests; and patient medical history data. Other operating requirements at these other facilities were accomplished manually.

To eliminate the loss of control and lack of security inherent in using several outside services and clerical systems and to increase the scope of automated systems in Phoenix, CGMP combined all the HMO data processing requirements into a single information management system.

Terminals on-line to the C/300 allow

(Continued on Page 24)

Text Editor Update Dates Pages

PRINCETON, N.J. — The Extended Text Compositor (ETC), a documentation or word-processing system originally part of the Autoflow II flowcharting package, is now available as a stand-alone product, according to its vendor, Applied Data Research, Inc. (ADR).

Version 6.0 also extends the features available in earlier releases of ETC, including the automatic creation of a table of contents and an index for whatever document is being created and a macro/shorthand facility said to be particularly useful in creating tables and graphs.

The enhancements include automatic update indicators which identify revisions to an existing document through special markings or, optionally, revised page dating, an ADR spokesman noted.

In addition, footnotes are put in place by ETC, which allocates page space and formats the footnote according to specifications after the user supplies the message at each point of reference, he said.

ETC now generates user-supplied messages as formatted page headings or footings and takes care of other things including elimination of "widow lines" in the finished document by adjusting page contents.

Output text can be organized for either alternating left- and right-hand pages or as right-hand pages only, ADR said.

Version 6.0 supports an overstrike capability which causes specified text to be printed in a darker, essentially "bold-ace" type. It also includes several features to make the generated documents more comprehensible to international users, the spokesman noted.

The ETC update will be distributed to current Autoflow II users under the maintenance agreement. As a stand-alone package, ETC costs DOS users $5,300 and OS users $5,900, ADR said from Route 206 Center, Princeton, N.J. 08540.

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'Wylbur' Backs Both Interactive and RJE Operations

SAN FRANCISCO — Developed at the Stanford Center for Information Processing, the Wylbur text-editing and remote job entry (RJE) support system is now being marketed by On-Line Business Systems, Inc. (OBS).

While the developers had been distributing copies of the software to interested installations, the new arrangement should lead to a more standardized product with planned support for both customer problems and enhancements, OBS said.

Users of Wylbur can create, store and retrieve standard OS data sets on-line and interactively edit their contents, which may be source programs, documentation, correspondence, test data or JCL statements, an OBS spokesman explained.

When JCL statements are under Wylbur, the software allows users to submit jobs to the host system for batch processing. They can then sample the results before authorizing printouts on either a remote or a central printer, he said.

Wylbur is said to be inexpensive to operate (in IBM OS and OS/VS environments), simple to learn and capable of providing "excellent recovery from system outages." It supports the range of IBM 2741- and Ascii-compatible terminals in either hard-copy or CRT versions.

In common with other software systems that support on-line program development, Wylbur increases programmer productivity "sharply." Improvements "in excess of 25%" are "common," the vendor claimed.

Other development cost savings accrue from the ability to sample results and abort a compilation printout, for example, if there are too many errors to make it worthwhile, the spokesman added.

A perpetual license for the basic Wylbur package costs $17,500. Other terms, including lease, rental and installment purchase, are also available, he said from 115 Sansome St., San Francisco, Calif. 94104.

User Ratings Put 38 Packages On '76 Software Honor Roll

(Continued from Page 23)

Research, Inc.; and Minicom, Informatics, Inc.

Completing the list are SAS from SAS Institute, Inc.; Slick, NCI, Inc.; Software 1040, SAB, Inc.; SPSS from SPSS, Inc.; TLMS, Gulf Computer Sciences, Inc.; and Total, Cincom Systems, Inc.

'Systems' Packages Dominate

The 1976 Honor Roll was again dominated by "systems" packages as opposed to packages for specific applications, with 33 of the 38 products falling into the systems classification.

In 1975, 22 of the 25 packages were in the systems grouping, Datapro said.

Again, as in past years, most of the products on the honor roll were "relatively simple . . . with straightforward functions," Datapro said.

On the other hand, three "more complex, multifunction" data base management systems — IDMS, Image and Total — made this list, it added.

Burroughs' DMS-II achieved honorable mention with high ratings, but not enough users to qualify for full honors.

Six Ratings Needed

The number of ratings needed is only six. Although this has been criticized by some as the weak point in the honor roll qualification process, 23 of this year's winners would have been on the list even if the required number of ratings had jumped to 18, triple the current base.

Panvalet garnered 172 ratings and three others had more than 100 users evaluating them. Another eight had 40 or more ratings, Datapro noted.

Five packages — IDMS, CA Sort II, Cytos, DYL-260 and Fast/Dump/-Restore — shared top rating honors, each earning weighted average ratings of 3.8 out of a possible high of 4 in overall satisfaction.

Complete results of the 1976 user survey and the researchers' analysis of the results are in the feature report, "User Ratings of Proprietary Software," available for $12 per copy from Datapro, 1805 Underwood Blvd., Delran, N.J. 08075.

Eclipse Cobol Eases DP Work in Arizona

(Continued from Page 23)

physicians and other medical staff members to access each member's medical data. They can also retrieve reports from a comprehensive data base of supporting medical care information like unusual test results, drug-related data, disease classifications and prior programs of medical treatment.

Cobol batch programs manage administrative tasks and cost control functions. The on-line patient data retrieval operation is backed up by an Eclipse S/200 computer because of the critical nature of the data stored on the computer files.

The HMO is in operation 24 hours a day every day of the year and access to member data is maintained at all times through the use of switching devices and the backup machine.

CGMP chose the Eclipse systems to run its information management system because of its ability to run existing packaged programs and handle an ever-increasing workload of patient data, according to Robert L. Smith, who was in charge of the conversion effort.

Another significant consideration was the availability of a high-level Ansi-74 Cobol compiler and telecommunications software support, he said. The software features contributed greatly to reducing the manpower requirements in converting the large library of Cobol programs.

The telecommunications software enabled CGMP to speedily implement the on-line terminal portions of their systems, Smith added.

Compatibility with various data storage media permitted a simple transfer of data files from the various support services to the DG equipment, he concluded.

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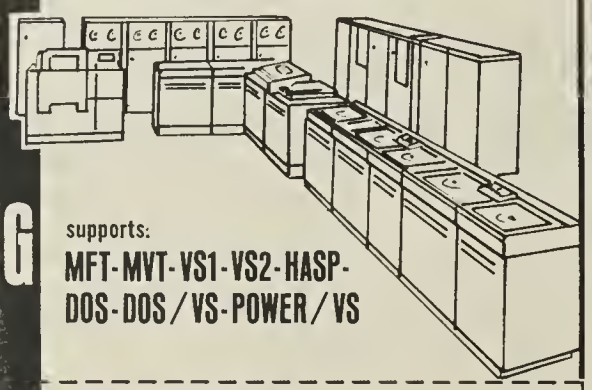

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Understandable, User Says

Software Physics Shows Managers What's Happening

By W. Kemp Clawson
Special to Computerworld

"How much more work can we do on our computer?" This question, asked often by executive management, has been difficult to quantify and answer in the past.

By employing software physics, however, we at United Virginia Bankshares (UVB) have now overcome this problem and gained new insight into the usage of our computer system.

UVB's executive level (non-DP) management requests a formal quarterly report on computer resource usage so it can make decisions concerning the budgeting of these resources. Since these men are primarily bankers and financial managers, the report must be presented in a fashion that they can relate to and understand.

This certainly precludes the use of such metrics as buffer hit ratios, channel busy time, or paging rates.

In addition, our report must be as accurate as possible with few or no "educated guesses." Thus we need a methodology that is accurate and "reportable" and provides the necessary management and technical information.

Studies Performed

In practice, two separate studies are performed. One uses IBM's System Management Facility (SMF) data and our operation's schedule to determine the tape and disk drive usage. The other uses software physics to address the kinetics of the computer system (or in software physics jargon, work).

This second study is the newest and most important to us since it centers on CPUs, channels and I/O controllers.

What is "work"? Inherently, everyone understands the concept of work and uses it (remember our beginning question?). More specifically, however, in a computer system work can be thought of as one byte (or character) of data moved or acted upon.

For example, a 1,000-byte record transferred across an I/O channel would be considered 1,000 works performed (or one kilowork, KW).

To be useful, however, the work must be analyzed by each equipment class (e.g., CPU, disk, tape, printers) in several ways — by the work done each hour of the day; by the work done by each application; and, finally, by the work done by our entire workload.

Additionally, so that we may relate this to our potential, we must compute our configuration's work capacity (again by equipment class).

From this data we derive the following information:

- A schedule, by hour and equipment class, showing work done and the capacity to do work.
- The configuration's work characteristics.
- The workload's work characteristics.
- Applications work characteristics.

This hourly schedule helps identify bottlenecks in time and equipment and show where reserve capacity exists. It may also be used for rescheduling work in order to better utilize our configuration. Knowing both the configuration and workload characteristics, we are now able to determine if our computer system is configured optimally for our work.

If not, this analysis indicates what equipment needs to be adjusted by either adding or removing capacity. If a certain application needs to be speeded up, then this same analysis is made comparing the application's characteristics with the configuration's.

Another use of this information is forecasting future configuration requirements.

We can further distinguish between direct (applications) and indirect (operating system) work, with their sum being the total work done. The indirect work data can be very valuable in analyzing such effects as paging in a virtual environment (with respect to resources used).

'How Much Capacity?'

Armed with this information, we can now proceed to consider the "How much capacity?" question.

That question is, unfortunately, much too general to answer at this point, but we can answer specific questions concerning our capacity to handle new applications (or increased transaction volumes) during a specified time period (our processing window). This, after all, is what we really need to know :"Can application X be added and executed in the necessary time?"

Using one of several techniques available, we can forecast the work requirements by equipment class with reasonable accuracy (± 5%). Now it is a simple matter to see if we have the capacity to perform this work, during the time specified, from our hourly schedule.

In practice, our quarterly report contains the hourly schedule of capacity and work done, trend information and a discussion of any exceptional circumstances about which management should be informed.

The next part consists of specific questions concerning new work which the computer performance evaluation (CPE) analyst answers after computing the new work and its characteristics.

Of course, if applicable, further analysis would be undertaken to determine new equipment demands if the present capacity is not sufficient.

The final product is reasonably short and necessitates a minimum of computer technology in its presentation.

As a result, management now understands our utilization report and has a quantifiable, structured approach to budgeting computer resources. The CPE analyst likewise is now very organized in his perception of capacity usage and reaps the following benefits from this approach:

- Current configuration's capacity.
- Configuration/workload tuning data.
- I/O subsystem efficiency data.
- Means to evaluate changes in hardware/software.

The use of software physics at UVB, although just beginning, has already gained management's acceptance and interest. For us, in our environment, software physics has proved to be invaluable.

Clawson is a CPE analyst with United Virginia Bankshares in Richmond, Va.

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'Intertest' Aids CICS Sites

HACKENSACK, N.J. — Interactive Test Controller (Intertest) is a program product which the vendor, On-Line Software International (OSI), described as a means to simplify and accelerate testing and debugging interactively in an IBM Customer Information Control System (CICS) setting.

Previously available techniques assisted the CICS user in diagnosing what happened after a system crashed.

Intertest reportedly prevents crashes, informs the user "what would have happened" if it had not taken corrective action and produces diagnostic information which eliminates dump analysis procedures, according to a spokesman.

Monitoring under the OSI package can be activated at the program, transaction or terminal level or on all applications within the system, he said.

The user may also work with a program flow trace option or set breakpoints to check intermediate data fields and other indicators midway through program execution, he added.

To use Intertest, the system program can prepare tables identifying such things as the number of items that may be controlled simultaneously; the program, transactions and terminals that should be monitored automatically; and options that are to be applied to each controlled item.

The tables can also show items that are to be excluded from Intertest's control.

The test/debug software supports all languages suitable for use with CICS (or CICS/VS).

Intertest is available for $6,500 and there are leasing and rental arrangements, the spokesman said from 411 Hackensack Ave., Hackensack, N.J. 07601.

Files Moved From Disk to Tape Under 'UCC Three' User Control

DALLAS — UCC Three-Adam, the disk management system from University Computing Co. has been enhanced, according to the firm.

A "migration" feature has been added which transfers data from disk to tape storage under control of user-selected criteria.

The basic package controls new data set placement on disk and enforces direct access storage device (DASD) usage standards before they are violated.

By identifying invalid and unneeded data sets, UCC Three-Adam enables the user to remove them on a timely basis, UCC said.

The migration feature extends that facility so that disk-based data sets which exceed criteria named as part of the Sysin input, are shifted to less critical tape for storage.

The user is free to name almost any criteria as the basis for transferring data to tape. Typically, size of a data set or the last date it was used might be the trigger, but users may also combine requirements to make the migration more selective, UCC said.

With the feature, failure of regular production jobs because of an apparent lack of disk space is "significantly reduced." This, in turn, may delay the date when more hardware is needed.

UCC Three-Adam functions in IBM OS, VS and MVS environments.

The package is available under a permanent license for $15,000, but monthly payment plans are also available.

UCC is at 8303 Elmbrook Drive, P.O. Box 47911, Dallas, Texas 75247.

MRP Runs Packaged For Datasystem 350

SKOKIE, Ill. — The Material Requirements Planning (MRP) package that processes a level-by-level scheduling and shortage reporting system, utilizing a bill of materials control routine, on Digital Equipment Corp. Datasystem 350s is now available from J. Baker & Associates, Inc.

The system is presently operating on a 22,000 item inventory with more than 60,000 bill of material relationships and as many as 56 levels of explosion, according to a Baker spokesman.

Reports generated by the system are said to include item lists with codes and costs, bills of material with costs and indented bills of material showing subsidiary relationships.

"Where Used" listings and stock status reports describing options are also provided, he said.

The system reports, level-by-level, customer orders prior to their explosion to the parts level.

It also documents shortages for both manufactured and purchased parts and components so that management can act before the shortages cripple the user's operation, the spokesman explained.

The package is available for $7,500 with modifications, if any are needed, at additional cost, Baker said from Suite 106, 5135, W. Golf Road, Skokie, Ill. 60076.

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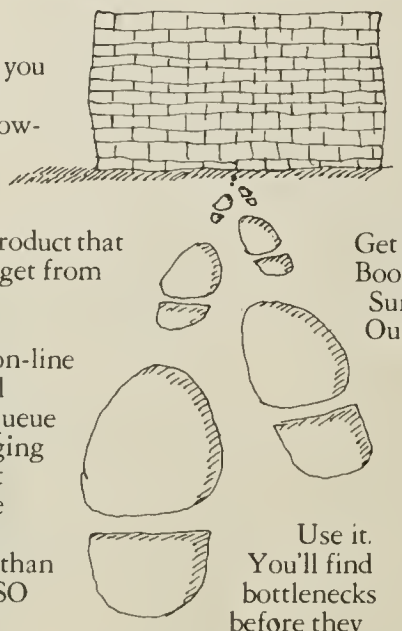

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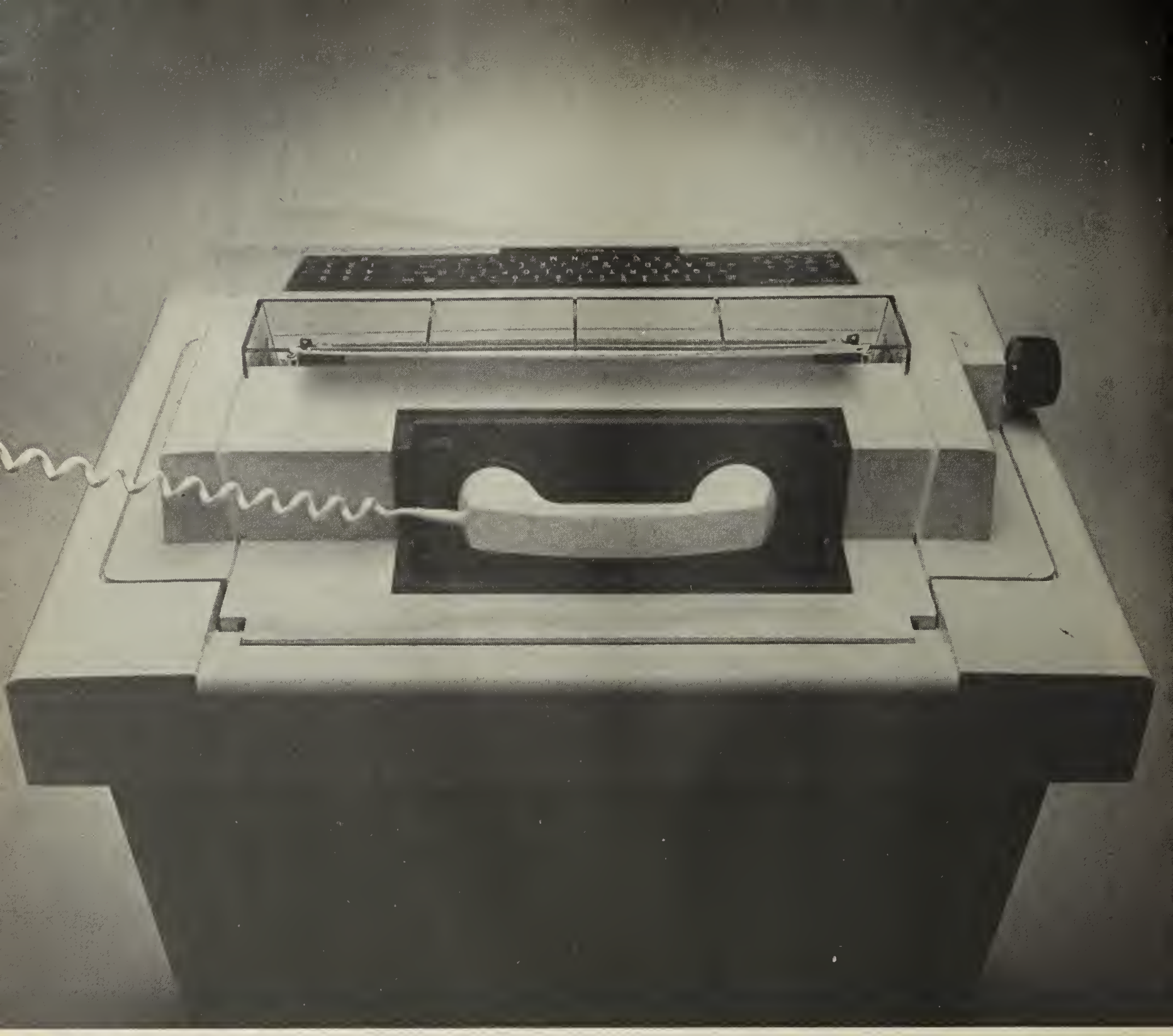

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Because of Increased Tarriffs

Daily Eager to Swap Dataspeeds for Less Costly CRTs

By John P. Hebert
Of the CW Staff

WATERTOWN, N.Y. — Writers and editors at a daily newspaper here hailed the installation of AT&T Dataspeed 40 terminals at all bureau offices in 1975 as a "brand new ball game" in news copy transmission.

But now they are not hesitating to replace the units with less costly CRTs because of vastly increased hardware tariffs for the Dataspeeds imposed last year by the N.Y. Public Service Commission.

Although eight Dataspeed 40s saved $9,000 last year in the cost of news transmission for the *Watertown Daily Times*, the rent hike of $100/mo for each of the tariffed units will cost the newspaper $9,600 more each year, according to John B. Johnson Jr., managing editor.

The Dataspeeds had replaced a network of Teletypes late in the summer of 1975. Transmission costs dropped from $28,000/year to $19,000/year, daily production times dropped and copy errors were also reduced from utilization of the AT&T CRTs, Johnson said.

Earlier this year, however, the hardware costs for the terminals increased to $250/mo, making them less cost-effective for the 40,000-circulation paper, he indicated.

The *Times* decided to replace the Dataspeeds last month and will soon install one Teleram Communications Corp. P-1800 CRT at each of its eight news bureaus and will purchase another for backup, according to Johnson.

Johnson said the Teleram units with 180K-character storage will cost $5,000 apiece, will pose few changeover problems for the computer-based paper's operations and will pay for themselves in two years.

The *Times* would have stayed with the Dataspeeds if they had remained price-competitive, Johnson pointed out.

The N.Y. Public Service Commission's year-old decision may cause wholesale defections in the state's Dataspeed 40 user ranks, which include the N.Y. State Police, he added.

Used to Cut Time

The Dataspeeds have been used at the *Times*' news bureaus in N.Y. and Washington, D.C., to cut the transmission time to the composing room here from one hour to less than 20 minutes.

"We used to run about 40 to 50 minutes of telephone calls between our Washington bureau and Watertown every night. With the Dataspeed 40 terminal, we move all the news in less than three minutes," Johnson said, adding the AT&T terminals worked at 1,200 bit/sec speeds.

Information from the terminals are captured on paper tape on an IBM 7 which is tied to all the newswire and sportswire services, Johnson explained.

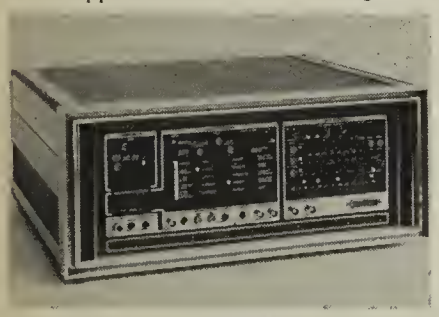
Incoming news copy is transferred to IBM 3270 CRTs for editing, rather than dealing with paper and pencil editing, and sent back to the 7, which outputs the copy to an IBM

(Continued on Page 30)

Codex Monitor Supplements Diagnostics

NEWTON, Mass. — Codex Corp. has introduced the Circuit Quality Monitoring System (CQMS) which is said to implement for the first time advanced concepts of data network monitoring in a standard product.

The microprocessor-based monitoring unit supplements the normal diagnostic



Codex CQMS

functions included in Codex's LSI Series modems, providing the network operator with a visual analysis of line operating parameters without interruption of data transmission, the firm claimed.

The CQMS is designed to operate with the Codex LSI series and relies on a microprocessor to perform a continuous analysis of the modem received signal in such a way that line disturbing effects are identified and displayed, according to a spokesman.

Actual signals received are compared by the CQMS against ideal values. The pattern of these variations is compared with stored algorithms, he said.

Once a disturbance pattern is recognized, the unit will display the presence of the disturbance when preestablished thresholds are exceeded, he explained.

CQMS monitors line parameters including amplitude modulation, phase jitter, harmonic distortion, band-edge distortion and noise. It provides an LED output at threshold levels.

A second function of the system is the ability to count parameters such as phase hits, gain hits, line dropouts and modem retrains. Hit counts are stored and can be displayed on the unit's digital readout, the spokesman said.

These hit counts can be continuous or programmed for a 15-minute interval for comparison with Bell practices for line performance, he noted.

Several display functions are available with the device, including modem Eye Pattern and a Tap Coefficient display which provides a visual indication of line amplitude and delay distortion characteristics, he said.

These distortion characteristics were previously determinable only from extensive off-line testing, Codex claimed.

CQMS also has the capability to store and provide replays of the modem Eye Pattern for real or "imaginary" error signals and amplitude and phase error signals for unattended disturbance recording, the spokesman noted.

These circuit quality display functions are combined in the unit with a digital readout decibel meter, audio monitor and a modem test set, he said, noting these functions can be utilized for other manufacturers' modems.

The rack-mount CQMS has inputs for four modems and can be expanded with the optional CQMS input selector which handles 16 Codex LSI modems, Codex said.

The system allows utilization of up to four input selectors to monitor a maximum of 64 modems at speeds up to 9,600 bit/sec, the company added.

The CQMS costs $5,750 or $190/mo on a two-year lease from Codex at 15 Riverdale Ave., Newton, Mass. 02195.

Perkin-Elmer Enters CRT Arena

RANDOLPH, N.J. — Perkin-Elmer Data Systems has introduced two microprocessor-controlled CRTs for users who need asynchronous, Ascii-oriented terminals.

Designated the Fox-1100 and the Owl-1200, the terminals are said to offer more features at a lower price than similar devices previously available. The lower cost is tied primarily to the use of a Motorola 6800 microprocessor, according to a spokesman.

Fox-1100, Perkin-Elmer's First CRT

The Fox-1100 is described as a teletypewriter replacement device for time-sharing and other interactive applications. It includes upper and lower case and an optional buffered printer port that can handle print speeds up to 960 char./sec, the spokesman said.

The 24-by-80 character display includes 9 by 12 dot matrix characters with lower-case descenders. A Typamatic repeat feature allows any key to be repeated if it is held down for longer than one-half second, he noted.

A transparent mode allows all characters, including control codes, to be displayed for program debugging. Also, the host mainframe can ask for mode status which will provide the position of all mode switches on a terminal.

The Owl-1200 is designed for transaction processing, inquiry/response and data entry applications and is said to provide a full editing display.

Like its 1100 counterpart, the 1200 has the

(Continued on Page 31)

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Daily Anxious to Replace Dataspeeds

(Continued from Page 29)

1130 for printing hyphenation and column justification, Johnson continued.

The 7 is essentially an I/O device for the *Times*' IBM 3/15 CPU, he said.

Eliminated Incorrect Messages

"Because of its highly developed editing capability, the Dataspeed 40 virtually eliminated incorrect messages, avoided inaccuracies and stamped out misspelled words," Johnson said.

"The simple and straightforward operation cleared the way for rapid editing — replacing, deleting and inserting characters or lines," which helped cut down the cost of human error, he added.

And although editors and reporters regard the terminal as 12 times faster than the teletypewriters they replaced, Johnson noted the Dataspeed's 1,200 bit/sec operation is wasted on a two-minute minimum line charge.

The Dataspeeds completed calls in less than 25 seconds, he explained.

While the Telerams operate at a slower 300 bit/sec transmission speed, Johnson expects no extra charges because transmission times will fall within the 120-second minimum duration.

In addition, there will be "no great loss of capabilities" with the Teleram CRTs and the *Times*' programming staff will only have to make "small programming changes" to bring them up to what Johnson hopes will be the level of the Dataspeed capabilities, he stated.

Johnson said he looked at other comparable terminals before opting for the Teleram's, but indicated there were fewer needed features. He added he couldn't identify the competing devices by name.

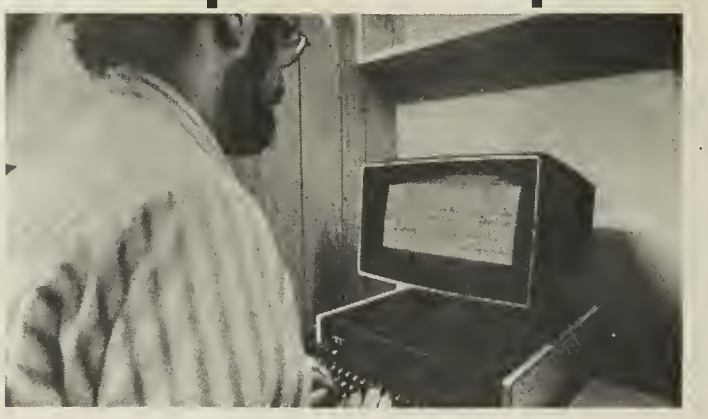
Johnson also said he was happy with the AT&T devices before the price increase, which he believed "was not AT&T's fault."

Prior to the installation of the Dataspeed terminals, teletypewriters in the *Times*' bureaus transmitted via dedicated lines.

The speed of transmission in that manner was dependent to a large degree on the typing and writing ability of the reporter composing the story, Johnson said.

Access to the teletypewriter was often a lengthy process, especially when reporters filed unusually long articles, jamming the telephone lines and denying other news bureau reporters entry to the same lines, he continued.

"The correspondents remained on the line as long as it took them to write their pieces, Johnson recalled.



Bureau reporter files story on Dataspeed 40.

Comdata Package Includes TI Teleprinter

SKOKIE, Ill. — Comdata Corp. has offered a Texas Instruments, Inc. 743 printer terminal and its own Model 150 acoustic coupler in a suitcase-like package.

The terminal/coupler/case combination permits shipping as baggage; and space is provided in the case for paper, pencils, etc., according to Comdata.

The case with components weighs 17 pounds and costs $1,685 from the company at 8115 Monticello, Skokie, Ill. 60076.

Event Counter Monitors Nets

INDIANAPOLIS — Although Esterline Angus Instrument Corp.'s event counter and time totalizer is primarily intended for industrial machine networks, it reportedly can be used to monitor data communications channels and computer networks.

The Model DE 2100 key-programmable data acquisition system allows the user to assign event-counting instructions to any one of a minimum of eight to a maximum of 248 data channels.

The counter has isolated inputs for connection to a modem output pulse or "carrier on" switch and comes with RS-232 interface.

A multifunction-key keyboard, numeric pad, integral printer and memory-save feature are standard with the device, which permits a maximum of 10 event/sec to be monitored.

An eight-channel counter costs $3,750 while a 32-channel version is priced at $4,275. Deliveries will begin in March; Esterline can be reached at P.O. Box 24000, Indianapolis, Ind. 46224.

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Conversion System Eases Transmission

FAIRFIELD, N.J. — An IBM-compatible system for moving magnetic card data to paper tape simplifies the conversion of data which is designated for transmission via Teletype or Telex, according to its vendor, Tycom Systems Corp.

The system can be useful to international corporations when a portion of data stored on magnetic cards as part of their word-processing operations must be transmitted over communications lines, Tycom said.

Included in the conversion system are the Tycom paper tape reader/punch (PTR/P) module and the Tycom IBM-compatible MCST magnetic card reader/writer module with electronic interface, according to a Tycom spokesman.

Although the PTR/P is inherently oriented to Ascii, any code can be accommodated, he claimed. Programmable code translation from one code to another is accomplished with a code converter built into the system.

The module will duplicate or transpose tapes at a maximum of 50 char./sec. With a special editor option, the tapes can be read or skipped by character, word, line or paragraph, he said.

The reader/writer module is reportedly suited for users who wish to read or write magnetic cards derived from or prepared for the IBM MCST.

The magnetic card module provides a connection to RS-232 interface for the Tycom input/output IBM Selectric typewriter as well as Tycom's PTR/P module, the spokesman noted.

Magnetic cards generated by an IBM MCST can be read by the reader/writer module which converts all codes to Ascii and outputs all signals through the RS-232 port provided with the module, he said.

The user may select any three speeds from 75-, 110-, 134.5-, 150-, 300-, 1,200- and 2,400 bit/sc. Parity is switch-selectable from even, odd or none, according to the spokesman.

The conversion system is priced at $8,500, he said from 26 Just Road, Fairfield, N.J. 07006.

Terminal Displays 1K by 1K Bits

IRVINE, Calif. — Genisco Computers has introduced the GCT-1024 digital raster graphics display system, a reportedly high-resolution graphics CRT terminal.

The system is capable of displaying 1K by 1K bits of information on the screen and is compatible with all Data General Nova, Digital Equipment Corp. PDP-11 and other minicomputers, according to a Genisco spokesman.

Has Discrete Microprocessor

The GCT-1024 includes a discrete microprocessor developed by Genisco that is said to provide instruction times of 150 nsec and 51 mnemonic instructions for increased user programming flexibility.

The basic raster display configuration includes a controller, CRT, software and the proprietary microprocessor, the spokesman said.

Keyboard Permits Programming

Options for the system include a table-mount joystick assembly, graphic tablets and cursors and a keyboard with up to 64 function keys, which permits user programmability of the system, he said.

Units with up to 16 gray scales are optionally available, he added.

The GCT-1024 is suited for command and control process simulation applications and others such as computer-aided design, weather mapping and crystallography, according to Genisco.

The basic configuration with a Nova interface is priced at $21,500. Genisco Computers is at 17805-D Sky Park Circle Drive, Irvine, Calif. 92714.

Dynatech Labs Fallback Switcher Provides Dial-Up Accessibility

ALEXANDRIA, Va. — Dynatech Laboratories, Inc. has added a dial-up access fallback switcher to its line of data communications control equipment.

The switcher provides A/B switching, remote modem substitution and remote dial backup for up to 64 on-line communications devices in groups of two, according to a Dynatech spokesman.

Available in 2- to 16-channel versions, the unit provides fallback switching of the RS-232 interface on an individual channel basis or on a group channel basis. For each channel, switching is between two modems and a terminal or computer port, between two terminals or ports and a modem or between other digital interfaces, he explained.

The fallback switcher is capable of handling data up to 9,600 bit/sec. It interfaces with a standard voice-grade telephone line and Bell Touch-Tone telephone through a voice-coupling access arangement (VCA).

Typical applications include system reconfigurations, bypassing of failed equipment or circuits and remote switching for testing and diagnostic purposes, Dynatec said.

Answer-back tones from the device provide identification of switching action. The switcher is accessed after dialing its assigned number. Failure to enter security codes causes automatic disconnect, according to the firm.

Options include a phone jack and push-to-talk handset for two-way voice communications, LED "carrier" indicators and carrier lost alarms, the spokesman noted.

The price for an eight-channel switcher is $2,700, he said from Dynatech at 900 Slaters Lane, Alexandria, Va. 22314.

Perkin-Elmer Unveils First CRT Terminals

(Continued from Page 29)

Typamatic keyboard capability for character repeat, but also includes an optional X-Y coordinate line drawing capability and a polling select option for multidrop communications, according to the spokesman.

The line drawing option is said to permit display of source document images designed to speed operator training and reduce input errors.

Field attribute controls of the Owl-1200 include inverse video, half intensity, blink, protected, numeric only, nondisplay and modified field definitions, he said.

The terminal's editing features are insert/delete character or line, clear screen, clear unprotected and clear line/field.

Easier Programming

Programming of the host CPU is reportedly easier with the 1200 because the host can "ask" for mode status position of mode switches.

In addition, SEND keys can be programmed to send all or part of the screen data, or programmed to send only a "request to send header," the spokesman said.

The Owl terminal also is said to provide program override on mode key settings. It also provides the host programmer with terminal and printer error and busy indicators, the spokesman noted.

The optional RS-232 buffered printer port for the Fox-1100 costs an additional $86, as does the 1200's polling select option, he said.

The optional line drawing capability for the Owl-1200 editing CRT terminal is priced at $85, he added.

The 1100 and 1200 CRTs — the first from Perkin-Elmer — cost $1,165 and $1,795 respectively, in quantities of five or less, the spokesman said from the company's Terminal Division at Route 10 and Emery Ave., Randolph, N.J. 07801.

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Due to Increased Business

Trucker Opts for Net to Cope With Billing Paperwork

SAN FRANCISCO — The 70th largest motor carrier in the U.S. faces many of the same problems as the nation's largest haulers: mountains of paperwork requiring a large clerical work force and stringent Interstate Commerce Commission (ICC) regulations.

The Delta Lines subsidiary of Delta California Industries opted for an intelligent terminal network to cope with increasing business and the corresponding billing paperwork.

While Delta Lines — including its division, California Motor Express — ranks 70th in terms of revenues, it ranks 15th in terms of volume carried and first in terms of intra-California traffic.

Although the length of a larger interstate carrier's haul may average 1,500 miles, Delta's average length is closer to 180 miles; and while an average freight bill at a larger, long-haul carrier could be $75 to $80, Delta's is less than $30.

The job of getting a freight-bill to the correct terminal location on time, however, is just as costly and equally important.

Although some larger carriers can afford an on-line computer system to keep track of their equipment on the road and transmit and store freight bills, Delta cannot afford the slow on-line editing and expense of such a system.

"We knew that we had to change from our Teletype system which had served us well when we were doing 4,000 to 5,000 freight bills a day — but at 14,000 daily, we needed a more effective and yet economical communications system, as well as one that would help minimize clerical billing errors caused by the pressure of preparing such a volume of documents within a very short time frame," according to Richard J. Frazer, secretary/treasurer of Delta California Industries and responsible for its computer operations.

The firm previously used nine-part freight billing forms, "copies of which had to be manually filed at the departure and destination sites, as well as at headquarters for accounts receivable.

"In addition, an audit copy (from which information was used for a batch card system) then became our permanent hard copy and was filed by freight bill number," Frazer recalled.

In addition, ICC regulations require general commodities carriers to collect their bills within seven days — which puts further demands on costly clerical staff.

"Our average length of haul is so short and more than 70% of our shipments handled are delivered on an overnight basis. We need to get the freight bill out to the appropriate terminal location the same night following pickup of the merchandise and no later than arrival of the freight at its destination or prior to arrival to allow the terminal manager to better plan the next day," he said.

"Many of our operating people had no idea how much volume to plan for until they actually arrived at work each morning and began opening the doors of the trailers that had arrived throughout the night," he explained.

First Upgrade Failed

"In early 1973, we began looking at the alternatives," Frazer, who was formerly the company's DP manager, said.

"We looked at everything from on-line systems to mini-switching systems with no editing capabilities to systems that could produce and transmit freight bills while providing magnetic tape for accounts receivable applications.

"Our first system used Memorex terminal devices, which were extremely well accepted by our people; it was intended to interface with a minicomputer for message switching.

"But, due to various problems, primarily

(Continued on Page 34)

Terminal Transactions

Foxboro Unveils 'Advanced' CRT Display Station

FOXBORO, Mass. — The Foxboro Co. has what it called "an advanced CRT operator display" terminal for use with its Spec 200 electronic process control system.

The Videospec display station provides access to all control-room operator functions such as set-point adjustment, valve handling, alarm limits and related process parameters, according to the firm.

The station connects to Spec 200 rack-mounted control electronics through the Interspec analog/digital communications link; operator interface with processes is accomplished through a variable function keyboard.

Unmarked keys are assigned various functions according to labels on CRT screens above the keyboard.

The CRT station is said to replace control-room devices such as push buttons, switches and other panel accessories. The terminal can handle about 200 different control loops, but as many as 12 process readouts can be displayed, depending on the amount of automatic programming built into the system, he said.

The display is programmed from microprocessors to handle a hierarchical sequence of display in quarter- and half-screen areas.

Other Videospec subsystem units — such as trend recorders and video copiers — can be optionally utilized in conjunction with the CRT station, which costs about $27,000, the spokesman noted from Foxboro, Mass. 02035.

Videospec Display Console

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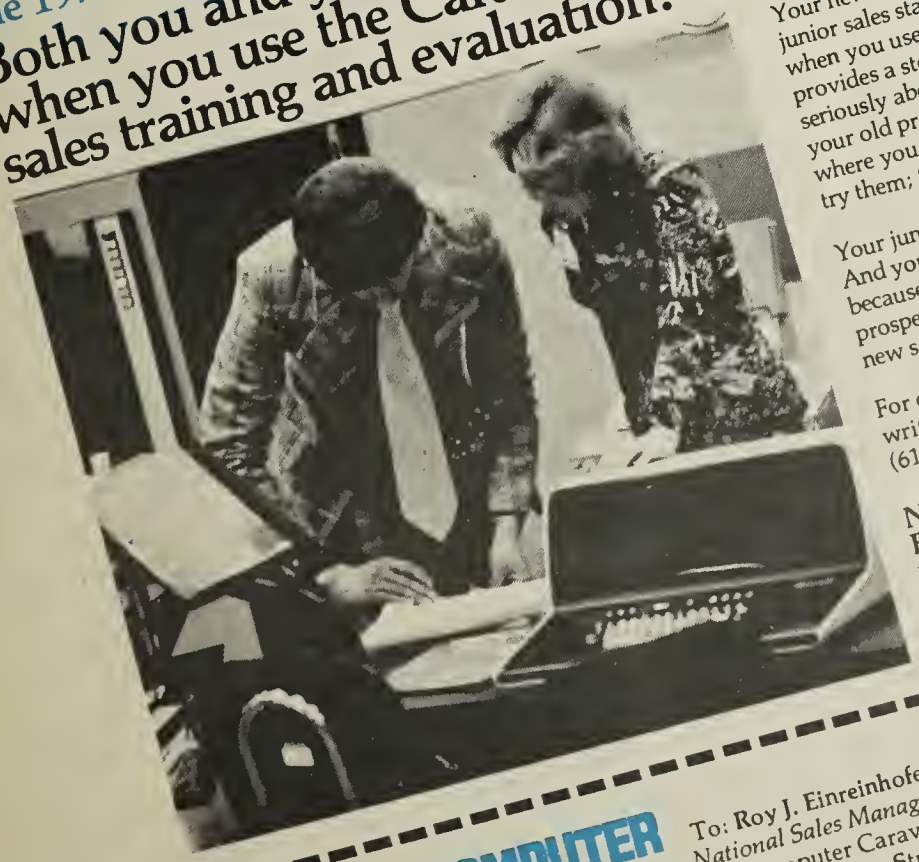

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Features Protocol Emulation

Delta Micro-Based CRT Designed For Variety of Nets

CORNWELLS HEIGHTS, Pa. — The Delta Data Systems Corp. 4050 is a stand-alone microprogrammable CRT terminal with protocol emulation designed for

Delta 4050

multidrop data communications networks utilizing Burroughs, Honeywell, Univac or other computers.

Similar in design and features to the Delta 4000 terminal, the 4050 reportedly provides the added capability of interconnecting several terminals on the same communications line to a CPU for random or sequential polling.

Display features of the terminal include a screen capacity of 80 columns by 25 lines of upper- and lower-case characters, half- or full-duplex and synchronous or asynchronous data transmission at rates up to 9,600 bit/sec.

It also incorporates an on-line printing feature permitting hard-copy output from the communications line without affecting operator keyboard entry to the display, according to the firm.

In addition, Delta's paging feature is said to permit the user to recover buffered information that has been rolled off the top or bottom of the screen.

A 2K buffer memory for refresh and display of screen data reduces the need for CPU support, according to a spokesman. The buffer can be expanded in 4K increments.

Additional Features

Communications features include a multiple-address feature which uses four 8-position switches to permit selective group or individual terminal addressing, he said.

The 4050 terminals also can be daisy chained in a "power failure protect" mode on a common communications line, he noted.

An optional downstream loader allows the user to change the polling interface in the terminal from a peripheral storage device or from a communications line, the spokesman stated.

And an optional communications line monitoring feature permits the 4050 to be operated in a full-duplex mode in which the traffic of all terminals in the system may be monitored for system start-up, debugging and troubleshooting, according to the firm.

For hard copy records of data transmission, an optional printer port is available, Delta said.

A polling interface is also available in the firm's user-programmable display terminal — the Delta 4550.

In addition to the polling interface, the 4550 includes 4K bytes of memory, expandable to 8K, and a debug package. The additional memory can be used for program storage for expanded refresh, according to the spokesman.

The price of a basic stand-alone 4050 without the daisy chaining feature is $3,025.

Delta is at Woodhaven Industrial Park, Cornwells Heights, Pa. 19020.

Terminal Transactions

Trucker Chooses Net To Cope With Billing

(Continued from Page 33)

with the mini manufacturer, the project failed and we were forced to reevaluate the entire concept and this time opted for on-site editing devices," he said.

"We chose Sycor, Inc. Model 340 terminals because of their intelligent characteristics, cassette orientation and communications facilities and began installing them in our 50 locations around the state," Frazer explained.

The Model 340s now check to ensure that the biller completes the shipper's name and address; extends the weight of the shipment; times the rate; totals the number of pieces, weight and charges; verifies that all origins and destination codes are valid; checks minimum rates/weights tables and searches for the proper rates; and extends service charges for fluctuating items.

Most of these functions had been performed manually by a rate man; completed information was then retyped by a billing clerk.

The bills of lading are collected at the terminal locations from drivers who, much like postal carriers, have specified routes. A terminal operator then takes the melange of documents, which can range from 3 by 5-in. to legal size, and keys the appropriate information onto a tape cassette.

When the overall procedure is completed, the information is transmitted at 2,400 bit/sec to a Data General Corp. (DG) message switcher which sorts the data by destination and retransmits the information to the appropriate location.

The information received by the 340s at the destination location is then printed out on Sycor printers in the form of delivery copies to be signed by the consignee as proof of having received the freight.

At the end of the billing cycle, the DG switching device sorts all freight bills — by shipper and origin — and transmits a manifest to each origin and destination location.

It then produces a tape (eventually there will be an interface) for Delta California's IBM 370/135 CPU in Oakland, which produces freight bills in debtor order for billing purposes and retains the image of all unpaid bills. For permanent storage, the freight bill is microfilmed from a magnetic computer tape.

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Terminex Broadens Hand-Held Line

NASHUA, N.H. — Termiflex Corp. has expanded its line of hand-held interactive data entry terminals with four additions.

The Termiflex HT/3, HT/4 and HT/8 terminals have display buffers, a 5 hy 7 dot-matrix display of Ascii characters and up to 1,200 bit/sec operation, according to a Termiflex spokesman.

Interactive Communications

These three terminals and the fourth, the HT/5, provide interactive asynchronous communications; they are RS-232C-compatible and have 128-character Ascii keyboards, he said.

The HT/3 displays a single line of 12 alphanumeric characters while the HT/4 has 24-character display in two lines. Both units operate at 1,200 bit/sec, have even parity, display the 64-character Ascii set and operate in full-duplex mode, he said.

The HT/5 was designed for applications such as credit verification where only the status of certain functions need be displayed. It has an annunciator display of 12 labeled lights under microprocessor control to transmit information to the terminal operator, who communicates with a CPU through the terminal keyboard, the spokesman explained.

The HT/8 offers a display capacity of 80 alphanumeric characters and symbols and operates at 10-,15-,30- or 120 char./sec in full- or half-duplex modes, he said.

The HT/3 costs $795; the HT/4 is priced at $1,195; the HT/5 input/verification terminal costs $495; and the HT/8 is priced at $3,995, the spokesman added from 17 Airport Road, Nashua, N.H. 03060.

Retailer Increases Efficiency With Programmable Devices

NEW ORLEANS — Intelligent terminals have reportedly increased data entry efficiency for City Stores Co., owner and operator of 150 general merchandise stores, women's specialty shops and furniture stores in the eastern U.S.

With the installation of the Texas Instruments, Inc. (TI) Silent 700 Model 742 terminal, system efficiency has increased to such an extent that "our slowest add-punch operator can now input as much data on the one TI 742 in a day as did our fastest operator on the old system," according to a City Stores spokesman.

The programmable data terminal was selected, he said, because it incorporated the necessary features and met the criteria specified by City Stored management.

The Model 742 microprocessor-based intelligence provides the mandatory field checks while offering the thermal printed output as the audit trail. The embedded numeric keypad made the transition from the addpunch to the 742 a smooth and easy one for the City Stores machine operators, according to the spokesman.

Old System, Old Problems

Billing information had previously been keyed on add-punch equipment which was rapidly becoming obsolete, the spoesman stated.

These electromechanical devices consisted of a full keyboard adding machine, a paper tape punch unit and a check-digit stuntbox. The latter unit was used to check customer account numbers which have a double-add-douhle Modulo 11 check digit.

The monthly billings were created from the individual sales tickets sent in from the local stores. The three fields which were keyed are customer account number, department number where sales ticket originated and the dollar total for the specific sales ticket. The only checking performed on this data were the check-digit and a batch total on the dollar amounts.

With the data entry errors, the rapidly deteriorating add-punch equipment and the extensive manual operations involved in the handling of the paper tape, City Stores initiated a search for a new system and vendor, the spokesman said.

Features which were specified included speedy entry, hardcopy audit trail, local intelligence resident at the machine site and high equipment reliability.

Because of future plans for expansion, vendor capabilities had to include nationwide service and support, have the ability to provide state-of-the-art technology in the future and offer a field-proven product for this application, he explained.

The system configuration has eight Model 742s communicating with the host computer, an NCR 251. The user-written program checks each and every data field on the sales ticket.

For example, the department numbers and dollar amount entries are checked for size, range and type.

The higher level applications programming language TI Cassette Operating Language, allowed City Stores to easily incorporate the Modulo 11 check-digit routine into the application program, the spokesman noted.

mn good partner.

Terminal Transactions

GRI Designs Adapter For Remote Printers

N. BRUNSWICK, N.J. — GRI Computer Corp. has a remote printer adapter for its System 99 which reportedly provides forms-handling capability for remote printers.

The printer communications adapter (PCA) accepts voice-grade communications between a System 99 CPU and the remote printer, according to a GRI spokesman. It can be used to connect a remote CRT terminal and a remote printer sharing one modem on a single communication line or used alone to connect the remote printer.

The PCA also allows hard-wired communications between the System 99 and peripherals at distances up to 1,500 feet, according to the firm.

Users control the remote print function by two control characters which activate and deactivate the remote printer. The PCA monitors all incoming dtaa for these control characters and channels the information to the printer and/or the CRT terminal, the spokesman explained.

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The problem with your big computer is that it was designed to work in batch. A mode of operation that has made your mother all too human.

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Most important, the ECLIPSE computer has a communications ability that lets you interface to your big computer. For example, when talking to an IBM system the ECLIPSE can emulate 3780/2780 and HASP procedures. Or just be itself.

And wherever you put an ECLIPSE system, you can plan on it doing more than one thing at a time. Up to 16 Idea applications and remote job entry concurrently, for example. Or one Idea application using up to 16 terminals while a COBOL program processes previously entered data. Or simultaneous program development and communications.

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For Maximum Efficiency

Shop Can Cut Costs by Redesigning Its Business Forms

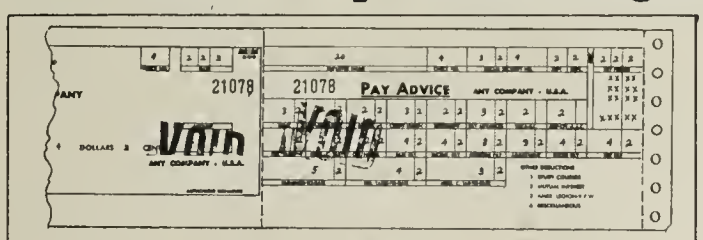
By Esther Surden
Of the CW Staff

NEWTON, Mass. — Saving money is the eternal DP priority and justifying spending money to save it is the eternal DP problem.

One way for a shop to cut costs is to redesign its business forms for minimum print time and maximum efficiency, a spokesman for Standard Register Co. said here recently.

To justify spending the funds for this endeavor, the firm has come up with a way for DP managers to analyze their printing costs — print cycle analysis.

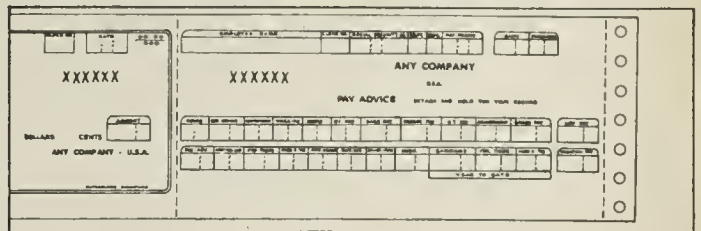
The object of print cycle analysis is to increase printer efficiency by eliminating spaces between print lines; rearranging print lines maintaining the same data; combining print lines and rearranging space; printing two documents at one time or side by side; and adding data to existing records.



BEFORE

Printing Line Identification	Number of Vertical Spaces Between Lines	Milliseconds Each Print Cycle
1. Employee Name to X's below pay period	2	105.0
2. X's.Line 1 to X's, Line 2	1	100.0
3. X's, Line 2 to X's. Line 3	1	100.0
4. X's, Line 3 to Bank line	2	105.0
5. Bank to Fed. Taxes line	3	110.0
6. Fed. Taxes to Earnings to Date Line	3	110.0
7. Earnings to Date to Employee Name (first line) on next form	9	137.3
Total Milliseconds of Print Cycle Time		767.3

Before Print Cycle Analysis



AFTER

Printing Line Identification	Number of Vertical Spaces Between Lines	Milliseconds Each Print Cycle
1. Employee Name to Bonds Line	9	137.3
2. Bonds to Pay adv. Line	3	110.0
3. Pay Adv. to Employee Name (first line) on next form	9	137.3
Total Milliseconds of Print Cycle Time		384.6

After Redesign

Users Redesign Forms

Users can determine if a savings will be achieved by redesigning forms by finding the print cycle time for the particular printer. Print cycle time is the time required for printing and the time required for vertical movement of the form.

For example, an IBM 1403 Model 2 printer operates at 600 line/min alphanumeric which is equal to 100 msec/line. Form movement of one single vertical space takes place during the last 20 msec of the 100 msec cycle, the spokesman said.

If form movement is greater than one vertical space, additional time must be added to the print cycle to determine the printing speed.

On single-speed printers, 5 msec are required for each line skipped after the first line, regardless of the length of the skip. On dual-speed printers 5 msec are needed for each line skipped after the first line up to 8 lines. After that, 2.3 msec are required.

Times Compared

The idea is to compare the current print cycle time with the print cycle time that could be achieved if the following steps were taken:

- Top or bottom stub documents converted to side stub.
- The number of print lines reduced.
- Two or more documents printed side by side.
- Form length reduced.
- Print lines arranged vertically to take advantage of faster spacing on dual-speed printers.

To illustrate the method of print cycle analysis, Standard Register used an IBM 1403 Model 2 with dual-speed configuration printing a payroll check (13-5/8 in. by 3-1/2 in.) laid out for seven print lines.

Annual forms volume was 300,000. The total msec of print cycle time for the stub was 767.3. (See accompanying charts.)

Redesigned to be 14-7/8 by 3-1/2 in. with the number of print lines reduced to three, the print cycle time was calculated at 384.6 msec. (See chart)

The formula for converting msec to hours of print cycle time is as follows:

$$\frac{\text{Print Cycle Time Per Document (Msec)}}{\text{1,000 (line/sec)}} \times \frac{\text{Forms Volume}}{\text{3,600 (sec/hour)}}$$

Using the formula, the form before redesign used 63.94 hours of annual print cycle time, while after it used 32.05 hours.

The difference is multiplied by the amount it costs to rent the printer each hour to calculate the savings.

Inforex Enters Distributed Area With System 7000

By Ronald A. Frank
Of the CW Staff

BURLINGTON, Mass. — Inforex, Inc. has moved out of the data entry area and into microprocessor-controlled distributed systems with the introduction of its System 7000.

The system includes the firm's first 16-bit machine which utilizes programmable ANS 74 Cobol. RPG-II is scheduled for addition late in 1977 with Basic early next year to give the System 7000 an ultimate complement of three higher-level languages.

In addition to multitasking which allows several terminals to access the same data base, "concurrency" on the System 7000 will allow users to run different applications such as data entry, processing, report generation and communications from different terminals at the same time, the company said.

Direct Memory Addressing

The System 7000 16-bit architecture is said to allow direct memory addressing, virtual storage and paging functions at "high internal data manipulation rates." The processor reportedly has overlapped I/O channels which allow movement of data in and out of external storage at rates "up to 312K byte/sec."

The processor has 224 instructions with an additional I/O capability of 62 addresses for multitasking performance usually associated with larger CPUs, Inforex said.

Both stand-alone and clustered configurations are included with the 7110 master control terminal that can support up to seven local or remote CRTs. The master terminal includes 64K of semiconductor memory and can support four mass storage units and a variety of printers operating at speeds from 45 char./sec to 600 line/min.

The 7110 and the 7115 stand-alone terminal are based on a "Nova 1200-compatible microcomputer," the firm noted.

Also included in the System 7000 is the Model 7210 local or remote satellite terminal. Storage peripherals include a diskette drive, cartridge disk and either 800- or 1,600 bit/in. 9-track tape.

Both transaction and batch processing can be supported with binary synchronous transmission mode for remote terminals. Compatibility with IBM's Synchronous Data Link Control will be added to the system 7000 later, the firm said.

The system can operate with no local files, small files, or mass storage devices. Multiple file access methods range from simple sequential to indexed and direct access. Programmability can range from centrally controlled programs down to the single-terminal level, depending on the needs of the user, the firm said.

Data Entry Features

A subset of Cobol will be available for implementing data entry features without additional programming. These features include cursor control, field definitions, check digits, table look-up, error control, insert/delete and similar functions.

Both master and remote terminals have 14 function keys which can be programmed for particular user applications, the firm said.

A four-terminal cluster with 64K of storage, 10M bytes of disk, 165 char./sec printer and binary synchronous communications costs $1,442/mo with maintenance. Purchase price is $57,450.

A stand-alone system with one terminal, 500K bytes of dual-diskette storage, Cobol compiler with batch capability and binary synchronous communications costs $340/mo with maintenance or $15,700 if purchased.

First deliveries are scheduled for the second quarter from 21 North Ave., Burlington, Mass. 01830.

NOAA Using Supercomputer to Predict Weather, General Causes of Climate

By Edith Holmes
Of the CW Staff

PRINCETON, N.J. — Just how predictable is the weather? The complexity of this question and the number of calculations required to even approach an answer to it demand a supercomputer.

And that's what the National Oceanic and Atmospheric Administration (NOAA) has working on the problem at its Geophysical Fluid Dynamics Lab here.

For the past two years, the $16 million Advanced Scientific Computer (ASC) has been used by the lab to conduct basic research in the degree to which the weather can be forecast and in the causes and effects of climate in general, according to James Welsh, supervisor of computer systems at the NOAA lab.

Manufactured by Texas Instruments, Inc. (TI), ASC has 1 million 32-bit words of memory and is capable of 50 million calculations per second, Welsh said.

"With something this size, we don't write programs; we evolve them," he noted. The Fortran programs run on the ASC have been 'evolved' over 10 to 15 years.

The mainframe is definitely the key to the computer installation at the lab, he stated.

The peripherals are the ordinary tape and disk drives. Only four large-head protract disk modules, each with a capacity of 25 million words, made especially for the ASC by TI, make the general-purpose system somewhat unusual, Welsh said.

'Fastest Machine'

From Welsh's viewpoint, the ASC at NOAA's lab is the "fastest machine being used as a general-purpose computer.

None of the Cray I's are used in this way as yet and Burroughs machines are still under development — though all these devices can accomplish more calculations in a second than can the ASC," he said.

The ASC is the lab's only computer and it supports all the research going on there. "In that sense, it is a dedicated machine," Welsh noted, but added the mainframe "runs batch over the counter and we saturate it."

The NOAA facility here has no professional programmers as such, according to Welsh. The 100 people at the lab — about half of whom are scientists, meteorologists and physicists — do their own programming.

Still in the basic research stage, it will be some time before the lab will be able to generate results that will make daily weather forecasts more reliable, if that is even possible, Welsh suggested.

Juggling so many simulated conditions of the earth's atmosphere and oceans, flow patterns, jet streams and ocean currents as it does, the weather model run on the ASC eats up computer power.

"We never have enough computing power," Welsh said and, before long, he will begin looking for a replacement for the ASC.

What that big, fast, central computer will be remains a mystery — even to Welsh.

Move From IBM to Univac Saves for Texas Counties

DENISON, Texas — Near the Texas-Oklahoma border, the Grayson Governmental Data Center (GGDC) is finding that its new computer is a real "winner" in coping with a hefty workload for five local government organizations.

GGDC came into existence in 1974 as a shared governmental data center with a $170,000 budget pro-rated between five governmental units. The Center, operated by eight employees, processes work for the cities of Sherman and Denison, the school districts of both cities and Grayson County.

Bob Kannenberg, director of GGDC, feels the decision to move to a Univac 90/30 system from IBM equipment has resulted in substantial payoffs.

"We've been able to avoid expenditures of between $6,000 and $10,000 a year solely by eliminating second shift operations," he said.

"When GGDC first started operations, we used an IBM 3/10, which had been used by the City of Sherman. The City of Denison had no computer of its own. However it was soon apparent that we couldn't achieve the throughput we needed to efficiently process the heavier workload for five organizations.

"If we continued with the IBM system we realized we would have to go to extra shifts and more personnel. Thus, we decided to shop around for equipment that would have the power and capability to process the work on a one shift basis," he said.

"One of the reasons for selecting Univac was that we liked their full support policy which was particularly attractive to us as a governmental body with budgetary limitations."

The contract was signed in June 1975 and the system installed in December of that year. The 90/30 ordered by GGDC has a main memory of 64K bytes, three Univac 8416 disk drives, an integral card reader and printer.

"The throughput on the 90/30 is outstanding," asserts Kannenberg. "Previously it would take us as long as six hours to process a utility billing for one city. Now we can do this work for both cities within three hours, allowing us to devote more time to processing new systems.

"Although there is no such thing as an easy conversion, our transition to the 90/30 went exceptionally well.

"By starting our planning at least three months ahead of time we were well prepared when the system arrived. As a result of considerable testing and debugging, plus the assistance supplied by Univac, we were able to move right over to the 90/30 without any parallel operations.

"We arranged with the City of Richardson, another 90/30 user, to use their equipment for a good deal of pre-installation testing of the more than 300 programs we had to convert," he said.

The heaviest user of the center is the City of Sherman, which utilizes about 48% of the computer's processing time.

Financial System

Besides utilities and taxes, one of the major applications for Sherman is a financial system involving departmental budgeting, accounting of revenues and expenditures, with daily and monthly reports.

The Sherman motor vehicles system keeps records of traffic citations. The traffic ticket is the initial source document for the system. Payments are processed, records updated and court dockets scheduled. Fifteen different monthly reports are run for the City Manager and Police Chief.

The Sherman ambulance system is involved with processing charges for ambulance service, keeping statistical records and recording payment receipts.

Also for Sherman is a gasoline reporting system for motor vehicles in the city motor pool. A monthly report is made to the state of Texas showing gasoline consumption on and off the highway. Under Texas state law, cities are entitled to a tax refund for the amount of gasoline consumed "off the highway."

Payrolls Prepared

Biweekly and semimonthly payrolls are prepared for employees of five organizations totaling about 2,000 persons. These are Grayson County, the cities of Denison and Sherman, Texoma Regional Planning Commission, involving Grayson, Fannin and Cooke counties and the North Texas Education and Training Cooperative, covering the three counties of Collin, Denton and Wise.

For Grayson County, a vehicle tax billing consisting of about 24,000 bills is processed by the 90/30. A real estate tax billing for the county, currently being performed by a service bureau, will be added to the computer's chores this year.

The Grayson County master file of 40,000 voters is maintained by the computer system. Precinct lists are prepared on the 90/30 for voting in the primary, general and local elections.

A file is kept for the Grayson County vehicle registrations. Listings are run for city police and the county sheriffs' offices. Through a special program, vehicle registration files can be accessed rapidly to check on specific vehicles.

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In First Installation

User Cuts Time 20% With Memorex 3340-Type Disk

NEW YORK — The Advertising Checking Bureau, Inc. (ACB) said it has gotten a substantial improvement in the overall performance of its computer system since installing a Memorex 3640 disk storage subsystem.

To handle the media verification, market and statistical research projects required by its clients, the bureau had an IBM 370/115-2 processor with 420M bytes of on-line storage provided by a leased IBM 3340 storage facility.

The ACB decided to evaluate the Memorex 3640 subsystem — a plug compatible alternative to the IBM 3340 — to determine whether the 3640 offered any measurable price/performance or reliability advantages over the installed equipment.

Following its evaluation of the two disk storage subsystems, the bureau elected to replace the IBM 3340s with purchased Memorex 3640 drives. It was the first 3640 subsystem installation.

The new configuration consists of the 370/115-2 CPU, a Memorex 3643 disk drive module/controller and two 3640 disk drive modules. Total subsystem storage capacity — 420M bytes — is the same as the previous IBM configuration.

Attachment of the 3643 was made via the Direct Disk Attachment on the 370. Conversion from the 3340s to the Memorex 3640 subsystem was "near perfect," ACB said.

The new installation has improved the processing speed of the CPU, according to George Sinks, director of management information systems.

This results from an advanced voice coil servo system incorporated into the 3640 drive that provides a 20 msec average seek time — 20% faster than the replaced IBM 3340s, he said.

Enhanced performance was not the only factor prompting the ACB to switch to the Memorex drives, however. "Almost all of our data processing activity is client related," explained Warren Grieh, executive vice-president of the bureau. "Thus, reliability was paramount in the final decision to purchase disk drives from an independent. Memorex has an excellent reputation for product reliability and quality," he added.

Honeywell Adds Features to PPS Printing System

WALTHAM, Mass. — Honeywell has introduced several enhancements for its 12,000-and 18,000 line/min Page Printing Systems (PPS).

The new features include colored toners, multicolored preprinted forms, character sets for letter-writing and simple forms-drawing functions, and enhanced software including support for printing Burroughs 6700 computer data.

All will be available in the first quarter of 1977.

"Current PPS customers can install any of the new options without causing any degradation in operation," according to Ronald F. Borelli, director of Page Printing Systems Operations.

"These customers now are producing on each system an average of 1.5 million pages per month. Some are producing up to 3 million pages per month on the faster printer and plan to add further work to the same system.

"The PPS's new versatility with color and letter-writing type-styles will permit customers to extend its use to the roughly 35% of computer printing that most companies do for distribution to customers," he claimed.

"Until now almost all applications within the non-impact printing industry have been limited to the 65% of printing usually devoted to internal documents, he added.

The color toner option is priced at $133/mo on a five-year contract or can be purchased for $5,600. It can be added to currently installed systems. Prices for green or blue toners vary from $13.75 to $16.50 per quart, depending on order quantity. Red is expected to be added in the near future.

A character-set extension for text printing provides for use of the PPS in text writing.

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Smithfield Packing Innovates With Hams, Third-Party Service

SMITHFIELD, Va. — Many users who have installed equipment from a variety of vendors have turned to third-party maintenance firms for service on their entire systems.

But Smithfield Packing Co. here isn't a multivendor shop and its reason for going to an independent maintenance firm was simply one of cost.

Smithfield Packing, a subsidiary of Smithfield Foods and originator of the Smithfield Ham, retained Raytheon Service Co. last March for primary field maintenance of its entire system.

Saving on Maintenance

Raytheon's third-party maintenance has been "equal to or better than" that which the firm had before and at a 25% monthly saving, according to Archie F. Allen, DP manager.

Smithfield, which does $150 million of business annually packaging hams, bacon and sausage, also owns and operates a chain of 23 restaurants (Family Fish Houses) in Maryland, Virginia and North Carolina.

The computer system to support these activities consists entirely of IBM equipment: a 360/40 mainframe, 2401 and 2403 tape drive and control units, 2501 reader, 1442 punch, 2311 disk drives, 2821 and 2841 control units, and a 1052 console.

"This system," Allen said, "is the backbone of our operation. It is an on-line, order entry system that also performs payroll, general ledger, sales analysis and sales realization functions.

"The system is operational 19 hours a day, and thus its continued functioning is critical," Allen added.

"We have, essentially, no backup for it. When it goes down, chaos results, and we can't load trucks, make shipments — or do any business.

Breakdowns

"Before we hired Raytheon, we had a couple of breakdowns for extended periods of time.We felt that we needed more routine maintenance to avert them."

At first, Allen said he was concerned about Raytheon's ability to respond quickly should a breakdown occur.

"When the contract was signed, the nearest Raytheon field service representatives were in Washington, D.C., or Richmond, Va. — a couple of hours away. Soon, however, they opened a service office nearby, and I'm confident that should a problem arise, a Raytheon engineer will be here within an hour."

More important, according to Allen, the Smithfield system now receives the preventive maintenance it needs. "Raytheon promised us maintenance once a week, and that's what we've received."

Owens-Illinois Shows 40% Throughput Gain With Calcomp Drives

TOLEDO, Ohio — Owens-Illinois, the $2.3-billion-a-year manufacturer of glass, plastic, paper and metal packaging, has increased throughput capacity by 40% because of a Calcomp 1035/235 disk storage facility, according to Donald R. Ice, operations manager at the DP center here.

This substantial increase in throughput capacity for the company's two IBM 370/155 computers is attributable to the unique dual access feature of the Calcomp disk system, he said.

Dual Access

This optional feature allows two controllers to access any two disk spindles through two totally different paths.Dual access thus improves throughput by balancing the work load between channels and reducing what would otherwise be wasted computer wait time.

"Before procurement of the Calcomp system (which consists of four 1035 controllers and 22 spindles of 100M-byte storage), our data load on one channel might be 80%, but on another channel, only 25%," Ice said.

CPU Wait Reduced

"With the Calcomp system and dual access, load on both channels is equalized to about 30% each, decreasing CPU wait time by about 10%."

Another advantage noted for the Calcomp 1035 is its failsafe capability. In the event of one controller's failure, a second controller is energized to support all drives, he noted.

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Mini Bits

'Mini' Appoints Sanford To Executive Post

ROLLING MEADOWS, Ill. — Donn W. Sanford has been appointed executive director of the Minicomputer Industry National Interchange (Mini), which has established executive offices at 4902 Tollview Drive, Rolling Meadows, Ill. 60008.

According to Jon David, Mini president, the organization has an international membership base and is dedicted to those using or having an interest in mini and microcomputers.

Sanford, a Certified Association Executive, was formerly executive director of the Data Processing Management Association.

Three-Day Seminars for Cities

NEW YORK — A three-day seminar to examine the uses, economics, programming and implementation of minicomputers will be held in Chicago, Los Angeles and Toronto in February, April and June respectively.

The seminar costs $395 per person plus a $50 registration fee for each organization represented. Information is available from Heidi Kaplan, Information Systems Seminars, New York Management Center, 360 Lexington Ave., New York, N.Y. 10017.

Fundamentals Course Offered

MAYNARD, Mass. — Digital Equipment Corp. has a mixed-media audiovisual course on minicomputer basics designed to "present computer fundamentals" to management and technical personnel without DP knowledge, the firm said.

Called "Introduction to Minicomputers," the course works with a La Belle Courier-16T playback unit and includes a set of programs, workbooks, guides and tests.

It costs $1,950 for the materials or $2,449 for the materials and a playback unit, DEC said from Maynard, Mass. 01754.

Forms Decollated by Hand

BOSTON — Two products from Data Forms Co., Inc. called Webvelopes and Webletters for continuous processing can be decollated by hand, the firm said.

Designed for minicomputer and word-processing users, the forms can be "decollated in seconds," the company claimed.

Prices range from $80 for 1,000 to $20 per 1,000 for 25,000. The company can be reached at Box 381, Kenmore Station, Boston, Mass. 02215.

On-Line Dispatch System

'Safer' Helps Blaze Paths to Flames

By Esther Surden
Of the CW Staff

SAN FRANCISCO — The fire department here has implemented a minicomputer-controlled central dispatching system linking 45 fire stations and designed to get fire-fighting equipment to its destination as efficiently as possible, according to battalion chief Robert E. Rose.

The system, which has been operational since the first week in November, runs 24 hours a day, seven days a week under the control of two Digital Equipment Corp. PDP-11/40 systems.

The project to develop the system, dubbed "Safer" for System for Assignment of Fire Equipment and Resources, was funded by a $1.8 million bond issue passed in 1971.

A project team was formed to supervise the design phase. During this phase, Systems Science Development Corp., a subsidiary of PRC Public Management Service, "turned out the hardware and software specifications for the system," Rose said.

The firm competed with other contractors for the bid to do the actual system implementation and installation and was selected after "a lot of investigating."

Prior to the installation of Safer, every alarm that came into the fire department sounded in every station. The station watchman referred to an assignment card and compared this against a status board.

The watchman then decided which particular station was to dispatch equipment to the fire.

This method required that the status of all the fires in the area be kept at every station. With 45 stations and a rotating schedule of watchmen, "errors could creep into the system," Rose said.

In addition, the alarm was sounded via ringing bells, and studies had shown that "the shocking of the system at night was a direct factor in the high incidence of heart attack with firemen," he said.

Quick Dispatch

With the minicomputer-controlled system, a person reporting a fire calls in and gives its location and nature. The call is answered by a dispatcher wearing a headset to allow for hands-free operation.

While the caller is still on the phone, the dispatcher uses a CRT console to get the fire-fighting equipment moving.

The caller tells the dispatcher certain characteristics of the fire, such as if it is a building fire or a single-unit fire, and the operator codes in the response. The system responds with a suggested dispatch, which the user can override if necessary.

"Hopefully, since the system has been programmed to our needs, the user will simply verify the response that appears on the CRT. The operator will then press one button to activate the line or lines to the firehouses that will be involved in the fire. The information is transmitted to a Teletype at the firehouse and a tone alert is sounded to arouse the firemen. The power that is required is also activated," Rose noted.

The system stands by for an acknowledgement from the firehouse that the alarm has been received. This is sent by the watchman.

To assure the system is always working, the minicomputers poll every station every 15 seconds and get an answer back.

Hardware for the system includes the two minicomputers, three disk drives and two tape drives. "The information is written in two places at the same time so if we have one disk failure we can fall back on the other one," Rose said.

"We have three two-position consoles on the main floor as well as another console located in a separate room and used to monitor the status of the lines going to the fire stations. This can be used as backup," he explained.

Each of the consoles, which are specially designed, incorporates a TEC, Inc. 400 series CRT with a console keyboard that has a key for every unit in the service and alpha symbols for keying in such information as the street address.

Four of the stations are staffed round the clock with the rest of the stations available for backup, training and supervision. Communications to the fire stations takes place via twisted-pair lines "put in throughout the system some time ago," Rose noted. The fire stations have Teletype 28 KSR.

The use of a turnkey minicomputer system has given the department greater accuracy by giving the users greater control over the response, Rose said.

"In the past, it took about five people to handle a single incident: with the new system, one person can conceivably handle an entire incident through the receipt of an alarm to its dispatch and sending of information out to a station. The system eliminates all the manual looking up we had to do before," he explained.

"If we received a telephone call, we had to go to a manual file, check the location, availability of the unit, use the telephone dispatch or perhaps the bell depending upon the kind of alarm," which are all time-consuming steps.

EAI Parallel-Processing Family Interfaces to Digital Systems

W. LONG BRANCH, N.J. — Electronic Associates, Inc. (EAI) has introduced a family of small-scale analog parallel-processing systems said to easily interface to digital systems.

Digital connection is accomplished through the EAI 2000's built-in, industry-standard RS-232 or CCITT serial communications port, a spokesman said.

An optional parallel interface is used for high-speed bidirectional data flow.

The systems can also be used as stand-alone analog processors, EAI stated, with I/O conducted through a CRT console. The monitoring and control station "lets users access the parallel processor in the same manner as a digital computer would be accessed," via a keyboard program management feature, according to the company.

Software for the system includes a communications library of 60 Fortran-based routines used with the serial port for automatic program preparation and operation of the system's parallel mathematical blocks.

The parallel data communications port has a library of 25 Fortran-based programs associated with it, the spokesman added.

For users with large simulation problems, the firm offers a Fortran-based compiler called ECSSL which accepts differential equations and outputs a parallel-processor program.

EAI 2000

Designed for users in scientific, educational, aerospace and transportation fields, the systems can be used for simulation, system analysis and design, production testing and laboratory monitoring and control.

A basic EAI system including a CPU, user terminal and a basic set of parallel-processing modules costs $15,000. Prices range upward depending on the modules included, the spokesman noted from 185 Monmouth Park Highway, West Long Branch, N.J. 07764.

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Small Business System Helps Dealers Control Thousands of Inventory Items

Inventory control is a common problem shared by parts dealers everywhere, but two such dealers — Weber's White Truck of Washington, D.C., and Autoparts, Inc. of Providence, R.I. — have solved their inventory problems using a small business system.

Autoparts, a $2 million company with 35 employees, presently handles 22,000 items in its inventory.

"In a business like ours we have an extremely complex costing system with a very complicated pricing structure," according to Wilfrid A. Niquette, controller. "Our costing system is based on a percentage of jobber price.

"Upon the change of either this percentage or the jobber price, our employees, under the old system, would go through the files and manually erase the old price on each card and put in the new one," he explained.

In one case, this meant over 2,300 cards had to be revised either in our spare time or on overtime. Now, our small business system does it quickly.

"Moreover, our office staff has been reduced by 50%," he stated.

Investment Reduction

The company previously used a combination of manual accounting and a service bureau for accounts receivable. The inventory and sales information currently on the system has resulted in a better product mix and an 18% reduction of inventory investment, according to Niquette.

"Our original savings for tangible cost projects was estimated at $300 monthly, but there are also a number of intangible savings that result from increased employee accuracy and a better use of time," he said.

"For instance, we produce a variety of inventory and customer sales analysis reports. If we were to try to duplicate those using a clerical staff, it would require many additional employees or such reports would be unobtainable under the old system," he explained.

The business system at Autoparts includes a Basic/Four 32K CPU, two disk drives, three CRTs and one medium-speed matrix terminal.

Customized Inventory Control

Weber's White Truck found it could customize its inventory control system by using a preplanned software application package designed for general accounting functions common to a variety of industries, according to Ray Ashman, business manager.

With 28 employees at its Washington, D.C., location, Weber's did over $4.5 million worth of business last year and has an inventory of some 6,500 parts for trucks and engines.

Using the manual system, the counter clerk would scan a microfilm file to find the part number and then go to a large Wheeldex to find the location of the part in the stockroom, Ashman explained.

Then after finding the part — if it was there — he would bring it back, go to a large card file, find the part's inventory number and reduce the inventory.

Finally, he would have to go through an elaborate set of price books, find the price, and return to the counter to fill out the order form, he said.

Now, with a CRT on the stockroom counter, the clerk can ask the system for information and after getting the part number from the microfilm, he can type the number on the terminal, according to Ashman.

The screen indicates the part's location, its cost and the correct inventory count. A second CRT in the bookkeeper's office handles the accounts receivable.

Data Cartridge Drive Now Offered From 3M

ST. PAUL, Minn. — An OEM drive mechanism for the 3M Co. DC100A data cartridge is available from that company.

The unit, designed for incorporation in small systems, uses TTL logic and includes an electronic interface contained on two printed circuit boards, it noted.

Recording is accomplished serially across the tape width and encoding is independent of tape speed, the company stated.

The drive costs $400 in OEM quantities. Information is available from Dept. 125A, 3M Co., Box 33600, St. Paul, Minn. 55133.

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Calls Move 'Expedient'

Firm Combines Word, Data Processing

NEW YORK — The first user of IBM's Word Processor 32 system has called the move to the combined DP and word processing system "expedient."

Business Equipment, Inc., which previously used a service bureau for its DP functions and in-house IBM Magcard IIs for word processing, saw the need to find a better route. The Magcard IIs were getting bogged down, according to Stephen F. Schmelzer Jr., treasurer and chief of operations.

"We probably would not have moved from the service bureau for the DP if a combined system was not available."

"We'll use the Word Processor 32 for direct mailings to more than 1,000 customers on our mailing list," Schmelzer said. "These letters announcing new products and services represent the traditional word processing function — volume document preparation."

Schmelzer selected the system over competing available equipment for two reasons. He liked IBM's 24 hr/day service policy and he thought he could easily find trained operators for the system.

Programming is being done on the outside, he noted.

"The real reason we went to the combined system, however, is not volume, but accuracy. In our business, accuracy equates to success," according to Schmelzer.

If a customer wants 100 blue fabric swivel chairs and your order comes in 100 black vinyl stacking chairs, you've just bought your own mistakes.

"The transposition of a couple of digits on a part number can be costly. There are many variables in each order — as many as a dozen for a single chair — and we can't afford to make mistakes, he stated.

By using the system to assist in letter quotes and purchase documents, "we think we can improve accuracy, build profit and assure customer satisfaction," he contended.

In furnishing a multistory office building or assisting with a move of a corporate headquarters, Business Equipment served as a contractor or consultant, Schmelzer explained. Sales personnel work closely with an architect or specifier.

Working within customer budget requirements, the specifier is introduced to the large number of manufacturers who might supply the furnishings. Once a manufacturer is selected for each item, further details, such as color finish, style and price are determined, he said.

Between the initial document and the final letter quotation on which the customer signs off, there may be five or six major revisions.

The System 32 simplifies these revisions and assures accuracy by recording the information once for reuse in revised documents, according to Schmelzer.

Eventually the 32 will sort orders by manufacturer and allow for automatic generation of purchase orders, updates of delivery schedules, pricing information and so forth, he predicted.

"The 'global change' feature (replace a word or phrase throughout an entire document) will be helpful for us when a manufacturer discontinues a certain item, fabric or finish," Schmelzer said.

"The advantage of having all of our traditional DP functions, such as payroll, accounts payable, etc., in-house will be a real plus.

"The cost of the entire system is comparable to what we were paying to have only our accounting functions done by an outside organization.

"Now we will have word processing features, accounting functions and control of the reports we need," he added.

HP Cuts Printer Cost

PALO ALTO, Calif. — Hewlett-Packard Co. (HP) has reduced prices by 7% on its line printer subsystems purchased as part of HP 3000 systems.

Prices for the line printer subsystems range from $9,400 to $37,125. HP is at 1501 Page Mill Road, Palo Alto, Calif. 94304.

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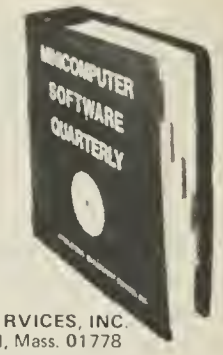

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Plastics Firm Converts to Small System For Upward Growth Compatibility

By Esther Surden
Of the CW Staff

MOUNTAINSIDE, N.J. — Upward compatibility and a growth path that doesn't mean changing CPUs each time the company expands were the reasons for Precision Polymers, Inc.'s decision to replace its IBM 3 with another vendor's small system.

"We weren't satisfied with the 3/10's capacity for upward growth, especially in communications and software," according to Robert S. Williams, director of management information systems.

The plastics manufacturer looked at a Burroughs system, an IBM 3/12 and the Honeywell 62/40 Liberator and "chose the Honeywell based on the capacity to add more core, the internal processor speed, the ability to add more drives and a faster printer without having to change hardware, Williams said.

"If we went to the 3/12, we'd have had to move all the old equipment out and the new in, and do the same thing the next time we upgraded," Williams said.

With the Honeywell system, the firm has a growth path for at least the next three years, he added.

The changeover also resulted in a $500/mo reduction in rental cost for the firm, Williams noted.

The 62/40 has 112K of memory, a 400 line/min printer and three disk drives with a total of 90M bytes of storage capacity.

Conversion Procedure

"The IBM system was out on July 1 and the other system in on July 15," Williams said, adding the interim period was used to change some flooring and put in a stand-alone air conditioning unit.

The computer room, he noted, had been cooled by the central air conditioning unit, but when that had been down, some problems were encountered with the 3/10.

Conversion to the system was performed prior to its installation, Williams said.

The system has a unit called the "Liberator 3" that takes RPG-II programs and converts them into Honeywell RPG. "It's actually a one-for-one conversion," he said.

The conversion took about a month, he added, because, "we ran into some problems with the files on the 3/10. The 3/10 allows alpha information to be placed in a numerical field, so it took us longer to convert the files."

Applications being run on the system include billing, order entry, accounts receivable, accounts payable, inventory control and sales statistical information.

Weekly Forecasting

"The biggest thing we've done has involved historic information for informal forecasting," Williams said. The firm's production is not very complicated, so forecasting can be done on a weekly basis, he explained.

In addition to Williams, the seven-member DP department includes a manager in charge of programming and program maintenance, an operator, a control clerk to coordinate between departments and three data recording people.

Eventually the firm hopes to put CRTs in its manufacturing plants for an on-line sales order processing package, Williams added.

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Calcomp Witness Says

IBM Bastion Was Xerox's Major Stumbling Block

By Molly Upton
Of the CW Staff

LOS ANGELES — One of the principal reasons Scientific Data Systems (SDS) turned from a profitable company into an unprofitable unit after its acquisition by Xerox was the shift in management philosophy that sought to market systems in IBM's territory, the business DP arena, according to Dan L. McGurk, former president of Xerox Data Systems (XDS).

After initially agreeing that Xerox's goals to make XDS number 2 in the industry and to remain profitable were attainable, he soon changed his mind and told management it must pick one or the other, McGurk testified in the California Computer Products, Inc. (Calcomp) vs. IBM antitrust trial.

Prior to its May 1969 acquisition, SDS had a "sound strategic plan for our computer line and for our marketplace, which was to attempt to fill the niches that were not well filled, that could be filled with current technology and little innovation, particularly the area of real-time control," he said.

SDS tried to stay out of the way of larger companies such as IBM, he said. Its systems were originally designed for scientific, real-time use.

McGurk characterized as "relatively unsuccessful" the firm's effort, begun after it became XDS, to find a market with a multiplicity of uses for its computer, such as scientific, time-sharing, on-line data collection and business. In this way the firm hoped to sell some systems for business DP by "piggy backing on our other strengths," he said.

Marketing to business DP users was difficult because they were used to the way IBM machines performed and were not anxious to deviate, he said.

For instance, the NCR printer XDS used generated printout that was upside down and was not easily glanced at by the operator, he noted.

Customers disavowed XDS' rapid access data file (RAD), consisting of a fast memory and tapes, insisting they needed disk drives because the IBM systems had them. So, although the designers thought the system didn't need disks, disks were added to appease customers' demands that the systems look like IBM gear, McGurk said.

As an example of the difficulty XDS had in the business market, McGurk said the Xerox campaign to replace Xerox corporate's IBM computers with XDS systems fizzled.

XDS learned its operating system was not of the same level as IBM's, in that its machines did not offer the handholding that business DP managers had come to expect from IBM systems, he said.

In addition, the software conversion costs were so high that there would have been no savings in converting the corporate IBM systems to XDS, he said.

XDS customers were traditionally very knowledgeable computer users who did not require such handholding, he said.

With the infusion of new managers and philosophy after the acquisition, management was imbued with the idea of running XDS as if it were a large company with a dominant share of the market.

Although the new managers were capable in the type of business to which they were accustomed, they didn't understand the business that SDS had traditionally been in "where we had a small part of a specialized marketplace, where we had to be very fast on our feet to stay running and to stay growing," he added.

The company's profit picture changed markedly. In 1969, XDS had about $25 million in pretax earnings. But in 1970, it had about a $10 million loss, while from 1971-75 XDS lost over $100 million, he stated.

The three principal factors responsible for the losses were the departure of the old management team, the infusion of the new team from Xerox and other firms and the move into business DP, he said, noting the recession contributed to the 1970 result, but not the other years.

Estimating the cost for Xerox to enter the computer business from scratch in 1969, McGurk said "entering the computer business is relatively easy. Designing a single computer and selling it to somebody, you have entered the computer business. That they could have done for a few million dollars. To become a factor in the computer business is an entirely different kettle of fish."

McGurk explained his answer to Xerox that XDS could rise from having barely 1% of the market to a number 2 slot and remain profitable.

"We, being brash and self-confident and looking at the resources of Xerox and how good we thought we were, said, 'yes, we can do those two things together. It will take between five and eight years,' " he said.

However, he changed his mind by spring of 1970, he said.

'Industry's Bellwether'

Financial Analyst Predicts IBM Stock to Split

By Toni Wiseman
Of the CW Staff

NEW YORK — An analysis of IBM stock splits from 1954 to the present has led a Wall Street analyst to conclude that IBM may split its stock on January 25, 1977 — a step which could spark renewed interest in the stock.

This would be good news for the entire industry since "IBM stock is the bellwether of not only the equipment group but the electronics group as well. And when its price-earnings ratio is dampened as it is now, it puts a damper on the whole technology group," according to Harry Edelson of Drexel Burnham Lambert Group.

"But, if IBM were to split and its stock were to rise, that would have very nice overtones for the entire technology group, too," he said.

In Armonk, an IBM spokesman indicated that the stock split is "just speculation on the part of an analyst and it is not our practice to comment on speculation."

IBM is currently the highest priced listed common stock, selling around $270 in a market where only three or four stocks sell at over $100, according to Edelson.

AT&T, for instance, is around $63, Exxon around $53 and General Motors around $78.

Edelson believes IBM may split its stock three for two, or five for four. The estimate of the size of the split may be only an educated guess, but the estimate of the date is probably quite accurate, he said, noting that in the past, IBM has always announced its stock splits on the last or next to the last Tuesday in January, concurrent with the monthly meeting of its board of directors.

IBM's stock first split, 5 for 4, in 1954, and eight times since then: 5 for 4 in 1956, 2 for 1 in 1957, 3 for 2 in 1959, 3 for 2 in 1961, 5 for 4 in 1964, 3 for 2 in 1966, 2 for 1 in 1968 and 5 for 4 in 1973.

Edelson based his prediction on several considerations: the normal interval between splits, the level of earnings per share in the year of the split, the stock price just before the announcement of a split and several "intangible influences" as well.

A major factor will be IBM's desire to broaden its base of shareholders, in part because of its antitrust suits and potential regulatory problems in light of its entry into the communications field, he said. AT&T, for instance, has 3 million shareowners while IBM has only 600,000.

Institutional investors are becoming more and more important in the market and the small investor is being pushed out, he said, noting that the small investor accounts for only about one-third of the New York Exchange's volume.

"But pension laws are forcing some major institutions to cut down on their stock purchases in companies in which they have too great an investment, and where else can IBM compensate but small investors," he asked.

Luring Small Investors

Low price and high dividends are what attract small investors, he said.

"IBM increased its dividend substantially which is likely to lure small invesntors, but the cart was before the horse because the price is still too high," he stated. "But if they cut the price, with the high dividend, that combination is likely to lure small investors."

IBM, he noted, pays the highest dividend of all office equipment stock, over a 3% yield.

Edelson suggested IBM didn't split in 1976, as some had said it would, because the stock had been lower and the earnings higher than had been expected.

In 1973, the average price-earnings ratio for IBM stock was 28.5. Before 1973, IBM's average was never less than 33, he noted.

At the time of the board of directors' meeting in January 1976, IBM carried a price/earnings of 19 times 1975 earnings and 17 times general estimates of 1976 earnings, Edelson said, concluding that "if IBM's ratio had been at its historical level of 30-50 times earnings in 1976, a stock-split would have occurred.

"So, although IBM's earnings per share were high enough to warrant a stock split, the price of the shares was too low," he said.

Edelson predicted that the stock would rise after the forecast split since the stock peaked at 365-1/2 (adjusted) on Feb. 13, 1973.

In May 1973, however, IBM stock began a two-year decline, sinking to a low of 150 1/2 in Oct. 1974.

IBM's stock price has now recovered to a level that is higher than on the dates of all previous stock-split announcements except for the last one on Jan. 23, 1973, he said.

"Therefore, low price/earnings ratio notwithstanding, [I] think it is highly possible that IBM will split."

IBM's current ratio is 18.

Cbema Cites 'Institutional Uncertainties' As Barrier to Development of EFT Systems

SAN FRANCISCO — The prompt resolution of questions regarding institutional arrangements for those involved in electronic funds transfer (EFT) systems is a key problem for manufacturers, according to the Computer and Business Equipment Manufacturers Association (Cbema).

"To date, the most significant obstacle to entry by manufacturers into the EFT market does not flow from their competitive relationships to each other," Cbema's President Peter F. McCloskey told the National Commission on EFT here recently.

"Rather, the principal uncertainties are in terms of the institutional arrangements within the financial community, for example, the unresolved branch banking questions, and the communications field — involving the role to be played by regulated communication common carrier entities in future EFT developments."

"In all likelihood, these institutional uncertainties have affected the market's response in terms of innovative offferings and may well have led some manufacturers and service vendors to act more cautiously than they might otherwise have done," he noted.

Commenting on the impact of competition between regulated monopolies such as AT&T and unregulated suppliers of EFT services and equipment, McCloskey pointed to the Transaction Network Service (TNS) offering of the Bell System as an example of the uncertainties which exist concerning the future role of regulated communications common carriers in the EFT field.

McCloskey suggested that AT&T intends TNS to provide services similar, at least in part, to those provided by the developing proprietary switching systems (switches).

"However, for the EFT switches to develop and meet the needs of the financial, business and consumer communities effectively, it is evident that their activities must also encompass critically important DP and recordkeeping capabilities.

"It is entirely likely, therefore, that the thrust of regulated common carrier activity will include an effort to expand into these DP and recordkeeping fields in order to develop new market opportunities for themselves," he said.

"But, the net effect of such a development could well be a serious derogation of existing public policy precluding the offering of DP services by regulated communications carriers within the framework of their regulated and tariffed communications offering," he said.

While Cbema supports competition, in its view, new entrants, such as the common carriers, should not be unfairly favored as a result of their base of operations in the franchised, publicly licensed communications business, McCloskey stated.

He asked that existing policies requiring that any regulated carrier providing DP services must do so through a wholly separate subsidiary be reaffirmed explicitly in terms of the EFT field.

McCloskey noted Cbema's view that "the provision of TNS by the Bell System raises serious questions of cross-subsidy of the TNS service by Bell's monopoly service.

"It may well be that the general telephone user and other Bell customers are being forced to pay part of the cost of TNS," he added.

In Response to Datapoint Suit

CA Files Antitrust Suit Against Datapoint, Others

By Toni Wiseman
Of the CW Staff

LOS ANGELES — Computer Automation, Inc. (CA) has filed suit in federal court here charging Datapoint Corp., TRW, Inc. and TRW Datacom International with conspiracy and monopoly in violation of federal antitrust laws.

The suit — which asks for treble damages and an injunction enjoining the further prosecution of a Superior Court Action brought by Datapoint in 1975 against CA — charges the three defendants with restraint of trade, boycott of CA Commercial Systems Division products and monopoly of relevant market areas in which CA and Datapoint compete.

This is a sequel to a continuing saga since Datapoint has a suit against Computer Automation filed in the Los Angeles County court since May 1975.

In San Antonio, Datapoint would not comment on the merits of the case, indicating that it has "adopted a policy that we will not try these cases in trade papers rather than in a court where they belong."

Datapoint has, however, filed a motion to stay action on the CA suit until resolution of its suit.

A spokesman from TRW's headquarters in Cleveland said the firm is "thoroughly familiar with the claims and thinks they are without merit." TRW is therefore taking the "normal litigation procedures," he said.

Datapoint Trade Secrets

CA allegedly acquired the Syfa software system from Datapoint's distributor in the Republic of South Africa, Computer Advances (Pty.) Ltd.

In the case in county court, Datapoint charges CA and Ivan Socher and other former principals of Computer Advances with trade secret theft. It seeks damages of more than $1 million and exemplary and punitive damages of $5 million.

Datapoint said it expects that case to come to trial within six months.

Datapoint charges that its trade secret information, such as source codes for its systems, specifically Datashare, were misappropriated and used in the "development" of the Syfa system.

The Texas firm also seeks to enjoin defendants from selling or leasing a computer product which in any manner uses Datapoint trade secrets.

CA Cites Conspiracy

CA alleges that TRW's TRW Datacom International unit, acting as foreign distributor for Datapoint products, threatened in 1974 to withhold new Datapoint technology and products from Computer Advances of Johannesburg, South Africa, unless it ceased demonstrating, promoting and selling Computer Automation's Syfa system.

Computer Advances is the South African distributor for both CA and Datapoint.

As a result of this "conspiracy" the Syfa system has been effectively "boycotted" in South Africa, the suit contends.

The suit further alleges the conspiracy continued with the filing of a "groundless" lawsuit against CA by Datapoint, alleging the misappropriation of Datapoint trade secrets.The suit was prepared with the assistance of TRW, CA alleges.

CA's complaint also alleges that Datapoint brought its suit as part of an overall scheme to monopolize their particular market and eliminate CA from competing in this marketplace.

CA is asking for unspecified treble damages for loss of profits, for substantial legal costs in defending against the action, and for being illegally excluded from a foreign market, as well as for loss of confidence by customers and the financial community.

Datapoint's response counters that the suit consists of the same claims as the action in county court, "couched as an antitrust action."

CA filed the claim in order to disrupt proceedings by imposing the burden of multiple litigation on Datapoint and the courts, Datapoint charged.

After Datatpoint filed its suit in county court against Socher and associates, but before it named CA as codefendant, CA previously filed an action in federal court but this was dismissed and CA entered a cross complaint in county court.

Judge Warren A. Ferguson is expected to rule Jan. 17 on Datapoint's motion to stay action on the filings in federal court.

...Anrix Also Sues Datapoint Charges Monopoly of Mini Mart

PHOENIX, Ariz. — Anrix Corp. has filed suit against Datapoint Corp. charging unfair competition, restraint of trade and attempted monopolization of the market for minicomputers.

The suit alleges Datapoint adopted a deliberate policy of refusing to enter into maintenance agreements or provide repair service, on a time and materials basis, for all Datapoint equipment presently in use except for equipment that is purchased or leased directly from Datapoint.

Anrix, a distributor of new and used minicomputer systems, is seeking damages in excess of $2.5 million and injunctive relief.

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Time-Sharing Seen Losing Ground as Service Choice

NEW YORK — Total time-sharing industry revenues were approximately $640 million in 1975, a figure which should reach $1 billion in 1984, according to Frost & Sullivan, a market research firm.

The New York firm predicted that while the DP sector as a whole will grow at about 18% a year through 1984, resulting in expenditures that year of some $87 billion, time-sharing's share of the revenues will decline.

"Vendor profitability will [also] decline, falling from a current industry average of about 11.5% to no more than 5.3% by 1984," the report said.

"The declining importance of time-sharing is only one facet of a profound and continuing shift in the mix of services offered by remote computing services (RCS) vendors," the report said.

"Due to growing user sophistication, saturation of traditionally lucrative customer segments, and more direct competition with the autotransaction industry as well as the products of the burgeoning minicomputer industry, the RCS vendor must strive to remain viable in a buyer's market. His possible countermeasures are both limited and expensive," the report stated.

The firm said it based its predictions on intensive interviews with 50 users located in 15 major metropolitan areas. The 50 users had aggregate 1975 RCS expenditures of about $40 million.

The industry time-sharing (T/S) trend is toward constant availability, the report said. The T/S services of the ten leading vendors are available to industry users for an average of slightly over 115 of the 168 hours in a seven-day week; all leading vendors operate on Saturdays; and only two leaders shut down on Sundays and holidays.

Most of the industry leaders are full service vendors, offering T/S-related services such as remote job entry (RJE), extensive application libraries, training and technical support, according to Frost & Sullivan.

Few Offer Leasing Services

While only a few do not engage in contract programming, facilities management, and/or consulting, only a few offer equipment leasing services.

"Despite professed plans to the contrary, market factors will impel those T/S vendors inactive in certain of those related service areas to enter them," the report predicted.

Current vendor-published prices vary widely, Frost & Sullivan found, with connect charges varying from $9/hr to $22/hr; I/O charges from zero to $1.65/thousand characters transferred; and mass storage from 17 cents to 62 cents/thousand characters per month.

The T/S leaders represent every major hardware vendor: Honeywell, Control Data, Xerox and Digital Equipment Corp., but over a third of all installations are IBM. Most installations are multivendor, however, the interviewers found, with mainframe brands/vendor approaching two.

"Replacement of front-end processors is proceeding rapidly, occasioned by the growing prevalence of dual-mode (T/S and RJE) systems and broader support of higher line speeds," the study stated.

As to operating systems, "the gradually emerging current generation is all vendor-custom, dual-mode and compatible with all possible line speeds," the report said.

"Thanks primarily to the number of IBM mainframes and the available TSO, neither dual-mode nor custom systems incidence is likely to reach 100%, but will approach that figure," it said.

Documation Hits Telex With Suit

MELBOURNE, Fla. — Documation, Inc. has filed a countersuit against Telex International and Telex Computer Products charging them with restraint of trade, monopolistic practices and unfair competition.

The suit is in response to Telex's filing charging Documation with a breach of contract resulting in damages of more than $10,000. The contract was an agreement under which Telex would market Documation's Doc 2250 printer overseas.

The Documation suit denies all Telex allegations and claims Telex itself breached the contract.

The suit further alleges Telex "engaged in activities which constituted a combination, conspiracy and an unreasonable restraint of trade in violation of Section 1 of the Sherman Act," as well as violations of Section 2 of that act and Section 3 of the Clayton Act.

Documation is seeking triple damages as well as court costs.

ICL Forms U.S. Arm To Sell Singer Gear

EAST BRUNSWICK, N.J. — International Computers Ltd. (ICL) has formed a wholly owned U.S. subsidiary, incorporating Gogar Corp. and other operations of the Singer Business Machines (SBM) Division with ICL USA Ltd.

ICL, Inc.'s initial product line will consist of the former Singer/Cogar System 10 and 1500 series and ICL's 2900 system series.

Marketing and sales operations are scheduled to begin Feb. 1 at headquarters here under the direction of Geoffrey D. Rowett, president of marketing.

Frank Connors, president of the Operations Division, will oversee all manufacturing and research operations, which will be housed in the Cogar plant in Utica, N.Y. Connors was most recently in charge of Cogar and SBM operations in Albuquerque, N.M.

ICL, Inc. will provide service and maintenance for its products through a network of regional offices, a spokesman said.

Graham Settles Suit Brought Over Prospectus

GRAHAM, Texas — Graham Magnetics, Inc. has agreed to settle a class action suit filed against it in 1975 which charged Graham with publishing misleading and incomplete information in its prospectus and corporate reports.

The settlement, ordered by the U.S. District Court for the Northern District of Texas, Dallas Division, calls for Graham and certain of its officers to pay $821,825.

Graham said it denied any wrongdoing but deemed it prudent to settle the suit rather than pay future attorneys' fees for the litigation.

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Standards Indispensable

NEW YORK — It would be foolish for the Federal government to assume the responsibility for standards development, according to the chairman of the Federal Trade Commission (FTC).

"The main virtue of private standards is that they respond to and reflect market forces. A government-controlled system would be unacceptably more likely to politicize the marketplace," Calvin Collier told attendees at a meeting sponsored by the American National Standards Institute (Ansi) here recently.

Standards are indispensable and, properly administered, they are highly beneficial. But, the FTC is also worried that standards may also impair competition, he said.

"Almost by definition, standards eliminate alternatives. Since quality competition is every bit as important to consumers as price competition, we must be concerned about restrictions on it," Collier stated.

Purely voluntary standards pose fewer problems to competition than their mandatory first cousins in the sense that the legal or practical inhibitions on departing from them are relatively minimal, he explained.

But, "even the purest voluntary standards can limit competition by their very existence. They can diminish incentives for improvement so that producers have little reason to refine their products past the platcau level that meets the standard," he continued.

The problem is that "the purely voluntary standard, if not already extinct, occupies a place on the endangered list just behind the whooping crane," Collier stated, adding a veritable web of federal, state and local laws and procurement documents incorporates private and ostensibly voluntary standards.

"Creeping governmental adoption of voluntary standards multiplies and cements whatever anticompetitive effect may flow from those standards, he said.

Ex-SDS Vice-President Testifies

'Greater Good' Extraneous in Marketing

LOS ANGELES — "Good guys generally don't finish first," Daniel McGurk, former vice-president of Scientific Data Systems (SDS), wrote to his boss in explaining that "business ethics are not the same as personal ethics."

McGurk's 1965 memo, which was entered as evidence while he testified at the California Computer Products, Inc. (Calcomp) vs. IBM trial here, outlined business practices he condones.

It apparently dissuaded R.M. Beck, executive vice-president of SDS, from issuing a position paper, "Business Conduct Policy," which McGurk indicated stressed concepts such as "contribution to society" and "the greater good."

"If we muddle our minds with 'such concepts' it won't help us achieve our objective of profit which alone optimizes the use of resources in our economic system," according to McGurk, who was associate director of the Office of Management and Budget in the Ford Administration.

Profits and ethics are, "in my opinion, completely separate questions and completely separate problems which should not be confused."

In explaining his philosophy, McGurk said he did not think any of a "number of schemes, devious, dirty, mean and ruthless, are incorrect behavior in pursuit of corporate goals."

However, a number of steps most marketing employees would not consider morally wrong are generally bad business, he added.

These include disparaging competition, impugning the motives of unfriendly customer personnel, making promises that cannot be met or getting business by reciprocity, he stated.

Guidelines for Selling

McGurk outlined partial guidelines for selling situations.

"Tell the truth, although it is not necessary to blurt out all the unfavorable truths," he said.

One shouldn't criticize competition directly, but rather "show up competition's weakness by emphasizing [one's] corresponding strength, in a way that causes favorable comparisons in the customer's mind.

"Do not use blackmail, bribery or theft on a customer," he warned.

However, "gaining information by friendship, getting customer personnel inebriated, reading material on his desk, copying material customers lend us, or any other legal means is acceptable," he stated.

He also admonished that the same price should be offered to all customers under the same conditions in order to avoid unfair competition as defined by the Robinson-Patman Act.

Executive Corner

■ Stephen D. Bechtel Jr., chairman of the Bechtel group of companies, has been elected to the board of directors of IBM.

■ Louis H. Benzing has been elected president and chief executive officer at Decision Data Computer Corp.

■ Harry Dornbrand has been elected president of American Satellite Corp., a subsidiary of Fairchild Industries, Inc.

■ Max Hugel has been appointed executive vice-president and elected to the board of directors of Centronics Data Computer Corp.

■ George E. Dashiell has been appointed corporate vice-president and general manager for the Naked Mini Division of Computer Automation, Inc.

■ Robert E. Vernon has been named vice-president of marketing and business planning for Univac's Europe-Africa-Asia Division headquartered in London.

■ Yale Grayson has been appointed vice-president for Systems Development at Electronic Tabulating Corp. (ETC).

■ LeRoy C. Ostrander has resigned as a director and vice-president of Documation, Inc.

■ Norman H. Ukeiley has been appointed vice-president and program director of ITT Corporate Communication Services, Inc.

■ John Phillip Carley has been appointed vice-president/sales by Systems Engineering Laboratories, Inc.

■ Brian D. Wiltshire has been appointed vice-president and director of the marketing division of On-Line Systems, Inc.

■ Gregory Lewis has been named vice-president of credit card services and Orazio Manzi-Fe Pater has been named vice-president of cash management for National Data Corp.

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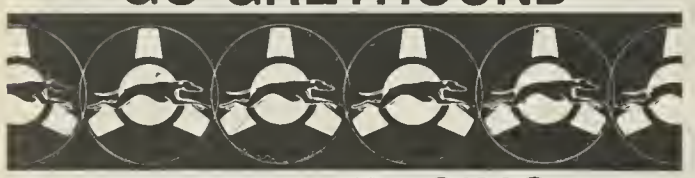

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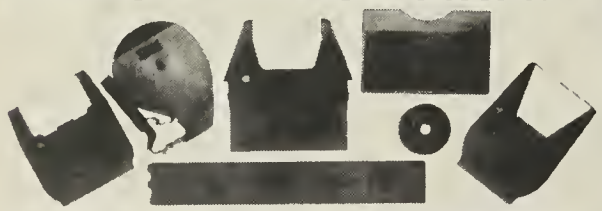

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Yeer Ended Oct. 2

	1976	1975
Shr Ernd	$3.65	$3.16
Revenue	95,270,000	74,404,000
Eernings	7,504,000	5,841,000
3 Mo Shr	.89	.81
Revenue	24,790,000	18,552,000
Eernings	2,015,000	1,518,000

ANDERSON JACOBSON
Three Months Ended Sept. 30

	1976	1975
Shr Ernd	$.11	$.09
Revenue	5,255,914	4,391,832
Eernings	262,090	227,215
6 Mo Shr	.21	.17
Revenue	9,997,132	8,430,363
Earnings	496,271	421,787

APPLIED DATA RESEARCH
Three Months Ended Sept. 30

	1976	1975
Shr Ernd	$.31	$.08
Revenue	3,934,077	2,919,354
Tax Cred	21,000	47,000
Earnings	381,150	97,734
9 Mo Shr	.93	.20
Revenue	11,166,874	9,486,558
Disc Op	.....	(131,840)
Tex Cred	384,000	115,000
Eernings	1,136,916	240,692

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SYSTEMS ANALYST PROGRAMMER

University computer center seeking systems analyst-programmer with working knowledge of: DOS-VS systems; CICS-VS; COBOL and BAL programming languages. Should have familiarity with problem analysis. Good verbal and written communication skills are essential. Background in designing and implementing on-line application systems desired. Bachelor's degree in Computer Technology or related field preferred.

Send resume including Salary History to:
Walter Miner
Director of
Data Systems & Services
PURDUE UNIVERSITY
CALUMET CAMPUS
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Startup computer installation seeks a designer/implementor to computerize a variety of interlocking systems. Accounting, programming, and systems design experience required. Dynamic environment needs a hard working problem solver, communicator, educator and diplomat. Two years of business programming and design experience expected. Accounting degree and online/DBMS experience highly desired. Salary $18-20K.

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Technically creative self-starter needed for one-year assignment. Possibility of continuation may be earned. Initially will travel to NYS cities to analyze and document payroll/personnel applications. Subsequently will produce detailed specifications and develop local payroll/personnel system, etc. Require polished communications skills — including documentation design, and analyst/programmer expertise (3+ years). Salary $18-20K.

Resumes with salary history by February 4, 1977
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The position involves programming in technical areas. Experience on large scale IBM 370/VS remote teleprocessing equipment, in addition to cost control application would also be helpful.

For consideration, please forward a complete resume with salary history and requirements to Employment Department, Dept. #128, Stone and Webster Process Industries Group, One Penn Plaza, New York, N.Y. 10001. Stone and Webster is an equal opportunity employer, m/f.

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2 or more years experience with emphasis in:
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DESIGN AUTOMATION ENGINEER
- BSEE degree with minimum of 3 to 5 years experience.
- Familiar with Fortran, Logic Simulation, Systems Simulation, and P.C. Board Design.

COMMUNICATIONS SYSTEMS ENGINEERS
A degree in engineering, computer science or equivalent is required with preference being an advanced degree. An MBA would be a substantial asset. Applicant must have strong systems orientation and substantial experience with communication systems. In-depth knowledge in one or more of the following areas are desired:
- Operating System Provisions toward communication, including communication access methods.
- Communication processor architecture.
- Communication link disciplines.
- Communication systems diagnostics.

Send resume including salary history to: Max Anderson, Professional Placement, Dept. CN, 3718 N. Rock Road, Wichita, Kansas 67226.

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Salary ($15,432 - $18,040), currently under review, is commensurate with experience. Fringe benefits package includes fully paid hospitalization, a Dental plan, and the traditionally excellent government holiday, vacation, sick leave and retirement plans.

For additional information, contact:
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MIS Professionals

ICI United States Inc., a multi-division subsidiary of one of the world's largest chemical companies, is seeking candidates for two openings in the MIS Department of our suburban Wilmington, Delaware location.

SENIOR BUSINESS SYSTEMS ANALYST

The successful candidate should have 6-8 years of general business experience including computer systems development and implementation. This individual should also have excellent communication skills as well as demonstrated creativity. On-line order processing or pharmaceutical experience would be a plus. Degree preferred.

SENIOR PROGRAMMER ANALYST

The successful candidate should have 3 to 5 years of general business knowledge with experience in COBOL, OS, JCL, and IMS or CICS, as well as good communication skills. Knowledge of on-line order entry/inventory control would be a plus. Degree preferred.

These are career opportunities in an established growth-oriented company. We offer an excellent salary and benefits program, as well as paid relocation.

Please send resume along with salary history in complete confidence to:

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Digital seeks innovative programmers to design and implement operating systems and network/communication software at all levels of complexity. The individuals will be operating in an unstructured, positive atmosphere with extremely talented peers. Background in operating system, design and assembly language programming is required. A definite plus would be experience with RSTS/E, RSX-11M or related minicomputer systems. BSEE, BSCS, MSEE, MSCS, or equivalent with 1-10 years experience indicates the many levels of openings available within Digital's dynamic exploding state-of-the-art environment.

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As software products manager (DECNET), you will be involved with the formulation of overall strategy for specific Digital network and communications products. One of your strong responsibilities will be defining and analyzing input from marketing groups and engineering groups to define requirements for products. Effective articulation and communications skills will help you develop and coordinate business plans for the total product manufacturing, marketing and sales including an on-going responsibility for profit enhancement. The successful individual will be aggressive without being overbearing, have a keen and analytical mind, strong computer knowledge with an applications and/or computer communications background, preferably in the large-scale computer area.

Forward resume outlining salary requirements and indicating position desired to Joe Hart, Digital Equipment Corporation, Dept. B117, 162 Main Street, Maynard, Mass. 01754.

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Personnel Dept.

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CF Industries, Inc.

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Your duties will include analysis, identification and solution development for repetitive network problems; the implementation of preventative maintenance programs; and the development of design changes and new designs to improve reliability and operability of our data communication network. Some travel is required, particularly in the initial stages of your work.

We offer a very competitive salary, excellent benefits, and the technological challenge and growth potential of an international computer services growth company. Please send your resume, including recent salary history to:

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District Manager

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The Data Communications Division of Harris Corporation, is one of the country's largest suppliers of remote batch computer terminals and distributed data processing systems. We are currently seeking a Field Engineering District Manager who will be based in San Mateo, CA., with responsibility for service of our products in California, Oregon and Washington.

The successful candidate should have 3-5 years management experience in the maintenance of digital electronic equipment, minicomputers and/or data communications equipment. Will have P&L responsibilities.

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For prompt consideration, please call COLLECT:

Joseph R. Lo Curto at: (213) 477-8291
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Two programmers needed to participate in extensive resystemization of a major business application and to provide systems and data research support in the area of Student Financial Assistance. One position offers significant design and technical responsibility. Both positions require a B.A. degree or its equivalent. 1-3 years experience for one position; the other 2-4 years experience of 360/370 OS programming experience in COBOL. Knowledge or experience in data base concepts/ packages will be a plus. Salary in low to mid teens. Send resume to Personnel Office, Department of Higher Education, 225 W. State St., Trenton, NJ 08625 by Jan. 24, 1977.

INFORMATION SYSTEMS TRAINER

Analyze requirements, design, teach, coordinate and evaluate technical DP training courses for State and Local government personnel. Must have: training experience, DP experience-minimum four years within the last six, COBOL programming (2 yrs.), business systems (2 yrs.), well-developed written and oral communication skills. Degree preferred. Salary range $15,000 to $19,000.

Send resume by February 7, 1977 to P. Morgan, State of Oregon, DSD-ISTS, 240 Cottage St., SE, Salem, Oregon 97310

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COMPUTER TECHNOLOGY FACULTY POSITION

The Purdue University School of Engineering and Technology at Indianapolis is seeking candidates to fill a position in the Computer Technology Department at the Assistant Professor level beginning August, 1977. M.S. degree and five years of relevant teaching and industrial experience required. Ph.D. desirable. Position responsibilities include full-time teaching in Associate of Applied Science and Bachelor of Science curricula. General systems experience is preferred. Some expertise in minicomputers/microcomputers would be helpful.

Applications must be received by March 15, 1977. Send to:

Dr. Robert G. Crozier
Purdue University School of Engineering and Technology
Indiana Univ.—Purdue Univ. at Indianapolis
1201 East 38th Street
Indianapolis, Indiana 46205

Data Base Coordinator

Coordinator has technical responsibility for completion of design, implementation and maintenance of an integrated data base information system under ADABAS and CICS using OS/VS1 on an IBM 370/145. Applicants must have B.A. or B.S. degree and significant recent experience with COBOL, data base systems including CICS and preferably ADABAS. Hardware environment: remote Data 100 terminal and CRT terminals to central dual IBM 370/145's.

Salary to $20,000 depending on qualifications and experience. Send letter of application, resume including salary history, college transcripts and three letters of reference by February 15, 1977, to: Robert D. O'Dell, Computer Services, Box 15, Metropolitan State College, 1006 11th St., Denver, Colo. 80204.

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Working as members of our Management Systems Development staff, these individuals will be challenged by a variety of assignments in commercial applications development and implementation.

The environment includes an IBM 360/75 and a 370/158, operating under OS/MVT/HASP.

The successful candidates must have several years experience in programming with a good working knowledge of ANS COBOL and at least one other programming language. Exposure to commercial software packages and data base or file management systems is desirable. A Bachelor's degree is required.

Kindly send your resume including salary requirements to: Mr. Peter Dowd, Employment Supervisor.

AVCO COMPUTER SERVICES

201 Lowell St.
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Requires 1-2 years experience in coding and debugging IBM 360/370 OS JCL, analysis and resolution of production abends, OS utilities, operations documentation review and turnover. Knowledge of MVS, TSO and hands-on computer operations helpful.

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Requires experience in such areas as: MVS, JES II, TSO/TCAM, VTAM/NCP, VSAM, IMS, and multiple languages, including ALC, COBOL, FORTRAN OR MARK IV. Must possess ability to provide fast problem resolution, analyze and interpret performance data, recommend and develop standards.

We offer excellent salaries, benefits, and growth opportunities. Send resume including salary history in strict confidence to:

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AMTRAK
955 L'Enfant Plaza SW
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Required experience must include minimum of three years writing basic, some college, and a proven track record in the design of business systems. In addition, the ideal candidate will have had exposure to data base management, RDOS, and Data General computer equipment.

Send resume in confidence to Mr. David Provost, Life Support Equipment Corp., 6 Gill St., Woburn, MA. 01801.

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Director of Personnel

Mohawk Data Sciences
1599 Littleton Road
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MDS

PROGRAMMER SOFTWARE SUPPORT

Addition to staff has created a challenging position in our System Support team. Experience in the internal code and control of OS/MVT, IMS, VM, UCC/20, TSO or DOS would help an individual in learning this job.

This position is at our corporate offices in Minneapolis. Starting salary based on applicable experience. Excellent fringe benefits including air travel. Send detailed resume or call (612) 726-7668.
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Requires degree in Chemical Engineering, Chemistry, Math or Statistics with experience in process simulation, mathematical modeling and statistical applications. The person we seek will have at least 3 years of industrial Fortran programming experience and a strong ability to communicate and get along with others. Salary commensruate with experience.

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SENIOR SYSTEMS DESIGNER

Engineering Design Data Base

This is an opportunity to join in the design and launch of an advanced, on-line bill-of-material system for product assumption and pre-release design information control. This multi-terminal system must interact with engineering, manufacturing and purchasing activities to capture and disseminate component, assembly and vehicle specification changes, and to aid in part usage codification.

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SR. MANUFACTURING SYSTEMS ANALYST

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Knowledge of on-line and communications oriented systems helpful. Mini-Computer, RSTSE operating system experience will be considered a definite plus. College degree preferred.

We offer excellent salary and fringe benefits package. Submit resume with salary history in confidence to:

ARMORLITE, INC.
Personnel Department
P.O. Box 1000
San Marcos, CA 92069

ANALYSTS and PROGRAMMERS

Boston University is seeking several experienced professionals for permanent assignments — some at the project management level — in its Administrative Data Processing Department.

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Previous experience with any of the following applicational areas is required:

- Student Registration
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- Admissions · Financial Aid · Housing
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Under an OS/VS 1 environment, we currently use a 370-145, to be replaced this year with a 370-148.

We are using and committed to structured programming in Cobol, IMS-VS, and Mark IV; experience in these is a definite plus.

Salary structures are competitive and commensurate with experience and ability.

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With S&L Processor

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COMPUTER NETWORK DIREC.
The W. Va. Network for Educational Telecomputing is seeking a director responsible for the overall management of the computer network and operation of the host site. The network consists of 15 state supported colleges and universities. The host iste operates IBM 360/75 and 370/145 systems and provides remote services to a network comprised of DEC PDP11/40's. Applicants should possess solid management experience with large scale computer system and telecommunications, as well as education/experience in computer science.
Salary: $25,000-$30,000
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Application Deadline: March 1, 1977
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MANAGERS, SYSTEMS

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Call or send resume or rough notes of objectives, salary, location restrictions, education and experience (including computers, models, operating systems and languages) to either one of our locations. Our client companies pay all of our fees.

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(609) 667-4488

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Suite 300, Dublin Hall
1777 Walton Road
Blue Bell, Penna. 19422
(215) 629-0595

RSVP SERVICES
Employment Agency for Computer Professionals

EXPERIENCED FORTRAN PROGRAMMER

SPSS, Inc. is a small corporation with eight years of success specializing in the creation and distribution of software for statistical analysis. The SPSS Batch System is the most heavily used and widely distributed statistical package in the world, with over 1200 installations. We currently have two openings at the $15,000 to $21,000 level for experienced FORTRAN programmers to work on our implementation teams for our established batch system and our soon-to-be-released conversational system. Each job involves working with a team of two or three others on both maintenance and development activities.

Significant experience in the development and maintenance of large FORTRAN programs is a requirement, as is the ability to communicate effectively both verbally and in writing. Desirable qualifications include specific experience under IBM's OS or DEC's TOPS-20 operating systems, experience in the use of the SPSS system, and familiarity with statistics.

Our convenient downtown Chicago location offers our employees the flexibility of commuting from virtually any part of the metropolitan area.

These openings exist now. Send your resume and salary requirements immediately to:

C. Hadlai Hull
SPSS, Inc.
Suite 1234
111 East Wacker Drive
Chicago, IL 60601
SPSS, Inc. is an equal opportunity employer

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Policy Management Systems, a major division of Seibels, Bruce and Company, is the industry leader in computerized property and liability insurance software systems. Our history of solid growth has created career opportunities for the following additions to our customer support team:

CUSTOMER SERVICE REPRESENTATIVES
INSTRUCTORS, TECHNICAL WRITERS
PROGRAMMER ANALYSTS

CUSTOMERS SERVICE REPRESENTATIVES are needed to work with customer personnel in coordinating installation of our computer software systems in insurance companies throughout the U.S. and Canada. Individuals with customer service, data processing, and property and liability insurance experience will ideally qualify.

INSTRUCTORS are needed to conduct both customer and in-house training in data processing concepts, computer languates (COBOL, ALC & RPGII) and in the basics of our insurance software system products. The ideal candidate will be technically qualified and an effective speaker adept at explaining technical topics in a non-technical fashion.

TECHNICAL WRITERS are needed to prepare professional, high quality texts which accurately and adequately document systems and programs for customer use. The ideal candidate will be able to understand program source code, and have a flair for producing effective user manuals.

PROGRAMMER ANALYSTS applicants should have three or more years programming experience in either COBOL, ALC or RPGII, preferably on IBM 370. Teleprocessing experience is also desirable. Write only in strictest confidence outlining education, experience, salary, history, and area of primary interest to:

MR. WES DANIELS
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P.O. Box 1
COLUMBIA, S.C. 29202

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(Market Product & Systems Evaluation)

This corporate level staff position offers latitude for individual expression and opportunity for visibility to facilitate your career path as a result of interfacing with domestic and international divisions of Marketing, Design Engineering and Product Software Development.

To qualify, candidates will normally possess an applicable degree plus experience in operational software or application software as a Progremmer, Systems Analyst, or Design Engineer; preferably knowledge of DOS-VS-OS-Communications-MIS and data base; analytical, evaluative and interpretive skills; ability to reduce technical matter to decision-making form and communicate effectively; and the capability to practice EDP skills individually, as a team member, or project leader.

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Minimum two years in programming supervisor or lead position and a strong innovative systems background.
Degree required with MBA/MS a plus.
Send resume and salary requirements to:

Director of Personnel
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Ball State University has an opening for a Senior Systems Programmer to implement, document, modify and maintain software packages from vendors. Work with faculty, research, and administrative personnel in a user services capacity while helping to maintain the DEC system 10 software. BS in Computer Science or related with 2 years experience with TOPS-10 desired. Basic knowledge of IBM operating systems helpful. Starting salary to $16,000. Excellent fringe benefits. 24 days paid vacation, educational opportunities. Deadline date for accepting resumes Feb. 7, 1977. Send resume to Personnel Services Office, Ball State University, Muncie, IN 47306. An Equal Opportunity/Affirmative Action Employer.

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Personnel Department
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If you can't make it or call, send your resume in strictest confidence.

INTERDATA®
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Systems Opportunities

The International Division of our expanding Pharmaceutical and Health Products corporation is presently seeking several capable Systems Professionals who can demonstrate their versatility and effectiveness in working with users to solve their problems through the application of information processing technology. All candidates must have experience in a large 360/370 OS COBOL environment and be able to communicate their ideas clearly, both verbally and in writing. A degree is required for each of these positions, and experience with IMS DB/DC would be very helpful. The positions currently available include:

Project Leader-Consumer Products

All positions require a minimum of 2-5 years experience and accomplishment in the Systems Design and Implementation area. It is also essential that applicants have a desire to accept responsibility and can demonstrate qualities of leadership.

Compensation includes good salaries commensurate with relevant education, experience and achievements, plus comprehensive employee paid benefits, including relocation to our headquarters facility situated close to New York City.

Sr. Programmer Analysts (3)

Interested qualified persons are requested to call 201-931-2367 collect or send detailed resume in strict confidence, indicating present and desired salary information and specifying position desired to: L.J. Timpone, Personnel Manager, Schering-Plough Corporation, Galloping Hill Road, Kenilworth, N.J. 07033.

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Systems/ Analyst

Local client seeking Financial Applications Analysts for IBM 370-135 DOS shop. Degree preferred. Knowledge of Data Base a plus. Salary to 18K. FEE PAID
Call Larry Weathers for confidential interview.

ROBERT HALF PERSONNEL AGENCIES
680 South 4th Street
Louisville, Kentucky 40202

The City of Flint, Michigan is recruiting for a Data Base Administrator, salary $17,299-$21,442. Appointment may be made at other than beginning rate. Requires education equivalent to Bachelor's Degree in Computer Science, Business Administration, Math or related field and at least 5 years experience in systems design and analysis, programming and operations with at least 3 years of the 5 years in a position of Administrative responsibility in a data processing installation using a Data Base Management System. Experience in the use of Cincom Systems, inc. "TOTAL" is preferred. Additional experience may be substituted year for year for each year of required college.

Applicants should apply, City of Flint, Personnel Office, City Hall, 1101 S. Saginaw St., Flint, Michigan 48502, Attention: Myra L. Fry.

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PROGRAMMER ANALYST

Nationally recognized consumer products company offers a challenging opportunity for a qualified male or female Programmer Analyst with a minimum of 1 to 3 years solid IBM 360-65 or 370-155, COBOL background, and the interest and ability to broaden professional application experience. Prefer college degree, strong motivation and ability to assume proejct responsibility. We offer an excellent salary and outstanding benefits including profit sharing. Please send resume, including salary history to:

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We are a leading international CPA firm with a well established and accepted management consulting practice. We are continuing to expand at a rapid pace, and as a result have entry level and senior consultant position openings in many of our U.S. offices for EDP/MIS specialists.

Our clients include business, financial, manufacturing, health care and governmental organizations. Typical projects include:

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- *Performance evaluations and hardware/software feasibility studies.*
- *Data systems security and internal control reviews.*
- *Long range planning using simulation and other techniques.*

Because of our size and number of offices, most of our consultants average less than twenty per cent travel.

Candidates must possess a high degree of initiative, drive and professional capacity — we are looking for "partner potential". A history of prior successes must be demonstrated by academic achievement and an increasing responsibility/leadership role over 2-6 years in one or more of the above project areas.

We offer a starting salary commensurate with ability, education and experience, and an environment in which you will directly influence your future advancement rate. If this appeals to you, send resume and salary history in strictest confidence to:

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PROGRAMMER/ANALYST BOISE, IDAHO

The City of Boise, Idaho is developing an advanced on-line municipal information system, the first on MODCOMP IV minicomputers. We require an experienced programmer/analyst (3 years +) to develop on-line systems in finance and administration. FORTRAN experience is essential. Transactional processing, data bases, real time operating systems and business systems experience is highly desirable. Salary/Negotiable. Send resume detailing work and salary history to Boise City Personnel Department, P.O. Box 500, Boise, ID 83701.
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Hardware/software experts to help build new computers to match the world's best software.

Telefile Computer Products, Inc., the only supplier of new peripherals and main memory for Xerox computer users, is embarking on a new challenge.

The development of two new Sigma computers. They will extend the line's capabilities well into the 1980's and take full advantage of Xerox' state-of-the-art CP-V and CP-R operating systems — software that the latest Datapro Research survey* shows as ranking first in the world.

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Only highly qualified applicants need apply for this exciting new venture with a computer company that has shown an average annual growth of over 50% five years in a row. Send resume and salary history to:

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Telefile Computer Products, Inc.
17131 Daimler Street, Irvine, CA 92714

Telefile

Telefile does it again.

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*Computerworld, December 13, 1976

MANAGER SYSTEMS PROGRAMMING

Rand Corporation, a leader in research applied to national problems, seeks a senior systems manager to assume management of all facets of control system design and implementation for the corporation's computing facility. Responsibilities include technical leadership of 10 system programmers supporting a MVT/HASP based 370/158 migrating to MVS, a PDP11/70-11/45 facility utilizing UNIX, a node on the ARPA network, and a WYLBUR online and RJE system. Currently planned are the installation of an AP and TSO.

Qualified candidates will possess a degree in Computer Science or related field and extensive experience in all aspects of control system programming including MVT/HASP and online systems. MVS experience helpful. Supervisory experience of a minimum of 5 system programmers required.

Send resume establishing qualifications, full employment and earnings history, and salary requirements to Kenneth R. Logan.

The Rand Corporation
1700 Main Street
Santa Monica, CA 90406
An Affirmative Action Employer

Opportunities in Colorado

Supervisor Equipment Operations:
Supervise computer equipment operations and data preparation area; also responsible for physical planning for computer equipment. Directly supervising staff of 16.

Supervisor Technical Support:
Supervise technical support unit of 7 people. Responsible for systems software and hardware-software resource management.

Data Base Analyst:
Must have IMS experience on 370/VS with minimum 5 yrs. systems and programming background. Duties include maintenance of Data Base and UCC-TEN Data Dictionary.

DP Education Coordinator:
Must have minimum 5 yrs. EDP education experience with technical knowledge of education materials and presentation techniques. Will administer EDP Education and Standards program for staff of 100.

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Knowledge in the area of microprocessors and minicomputers based on real-time operating systems.

participate in the design and implementation of mini and micro based realtime operating systems in a distributive network.

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Provide technical expertise and leadership in the areas of realtime terminal control and batch operating systems.

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Requires the ability to analyze and participate in hardware and software development programs.

Basic educational qualfications for these positions are a BS or MS in EE, CS or Math and 2 to 7 years experience.
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Robert L. Opalek
Employment Department
Terminal Systems Division-Dayton
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New Jersey	201/687-8700	Fort Worth	817/338-9300
Philadelphia	215/665-1717	Houston	713/626-8705
Washington, D.C.	703/790-5610	New Orleans	504/561-6000
Midwest		**West Coast**	
Chicago	312/782-0857	Irvine, Ca.	714/833-1730
Oak Brook, Ill.	312/986-0422	Los Angeles	213/386-5500
Cleveland	216/771-2070	Palo Alto	415/328-7155
Detroit	313/352-6520	San Francisco	415/434-2410
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(When writing, please be sure to indicate home address and current position title.)

If unable to call, write:
Source Edp
Department C-2
721 Enterprise
Oak Brook, Illinois 60521

SYSTEMS ANALYSTS
PROGRAMMERS ANALYSTS

Do you have experience in DBMS (design, programming, administration, maintenance, etc.) with related experience of two or more years in one or more of the following:

PDP/11 (RSTS/E)
Mini Computer Systems
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If so, we would like to hear from you.

We are a medium-size computer company specializing in several areas of data processing sales and service. We are in the market for a senior level person who is knowledgeable in the DBMS area and who is self-motivated, wants a challenging career and the opportunity for advancement based on performance, with an expanding company. BASIC, DIBOL and FORTRAN languages a definite plus. All replys held in strict confidence. Forward resume and salary history to:

CW Box 4869
797 Washington Street
Newton, Mass. 02160

EDP Auditor

Flowers Industries, Inc., a Diversified Food Firm, has an opening for an EDP Auditor with outstanding opportunities for management within Audit Department and Corporate Organization. Preferred candidates will have a degree in accounting and 1-3 years experience as an EDP Auditor or in the Systems Development environment. Travel 30-50%, salary range $15 to $18 per year commensurate with qualifications. Please submit resume and salary history in complete confidence to Earl A. Quigg, P.O. Box 1338, Thomasville, GA 31792.

PROGRAMMER/ ANALYST

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ROBERT HALF PERSONNEL AGENCIES
522 Fifth Avenue
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(212) 221-6500

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Lead Communications Systems Programmer. Supervisory experience with large communications networks in OS/CICS environment.

Senior Communications Systems Programmer. Experience with large network problem diagnostics in an OS environment. CICS and HASP RJE experience a plus.

Technical Writer. EDP systems experience to analyze technical data in systems specifications and to document standards and procedures.

Excellent salary opportunities and benefits. Mail resume with salary history to:

CW Box 4875
797 Washington St.
Newton, Mass. 02160

SENIOR PROGRAMMER ANALYSTS

OUTSTANDING CAREER OPPORTUNITY

A position is currently open for a Programmer Analyst with a strong PL/1 programming background in an O.S. environment. Applicants should be capable of performing all phases of Data Processing from problem definition/analysis through programming/implementation.

Experience in file maintenance and techniques associated with large customer related files would be helpful, but is not essential.

Advancement possibilities are almost unlimited for an individual with proven skills who is strongly motivated to further his career. Company's $30 million sales and 30% annual growth rate add up to unusual opportunities. Good starting salary plus liberal program of Company paid benefits.

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Charles W. Brandenburg
Processing Center Manager
14 Finance Drive
Danbury, Connecticut 06810

SENIOR PROGRAMMER ANALYST

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For further information on these and other positions, send your resume in strict confidence to:

Mark Fuller
Cadillac Associates, Inc.
32 W. Randolph St.
Chicago, IL 60601
(312) 346-9400

SYSTEMS

Expansion of our Point-of-Sale Systems Division

National Semiconductor has established itself as a leader in the rapidly growing electronic point-of-sale systems business. We are developing micro computer terminals tied to in-store multi-processor minicomputers. These in turn are connected via telecommunication links to IBM 370 host computers. Our continuing growth in this market has created many opportunities for programmers and system support representatives. If you are a self-starter and are results-oriented, we want to hear from you.

Software Development Programmers

We have positions immediately available from the entry level through management for systems development professionals. These positions are based in our corporate offices on the San Francisco peninsula. Experience should be in one or more of the following:

- **Communications systems - IBM 370 and minicomputer.**
- **Minicomputer operating systems, languages and development tools.**
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Will aid in the installation of key entry and scanning Datachecker supermarket systems. As systems support representative you will be responsible for the following:

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- **Customer training and consultation on in-store application language.**
- **Installation and support of in-store application packages.**

These positions are available nationally. When responding please list your area of preference.

For confidential consideration, please forward your detailed resume or summary sheet to Mike Hawkins, National Semiconductor Corporation, 2900 Semiconductor Drive, Santa Clara, California 95051, or call TOLL FREE (800) 638-1915. We are an equal opportunity affirmative action employer male and female.

National Semiconductor
SYSTEMS DIVISION

DIRECTOR OF MANAGEMENT INFORMATION SYSTEMS

Central N.J. community college seeks qualified candidates for the position of Director of Management Information Systems. The Director is responsible for all administrative, instructional, student personnel, and external agency data processing functions of the Computer Center and supervises 9 professional and 5 technical staff members.

The College now maintains an IBM 360/40 environment, with a new installation contemplated, and augmented by a PDP 11/45. The administrative objective is to develop a base of management information which can be used in operational, control, and planning activities.

Candidates must possess a Bachelor's degree in business, computer science or other applicable field; Master's, or equivalent in graduate education and experience preferred. Applicant must possess minimum of 6 yrs. experience in computing field, 3 yrs in management of computing activities. Familiarity with DBMS applications and prior experience in academic institutions desirable. Salary to $24K. Position available immediately.

Send letter of application and resume including salary history, references, and curriculum by Jan. 31, 1977 to:

CW Box 4864
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DATA PROCESSING MANAGER

NORTHERN CALIFORNIA

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Sacramento, California 95813

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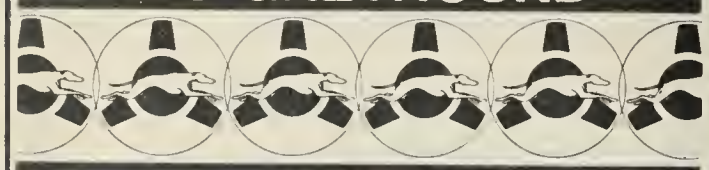

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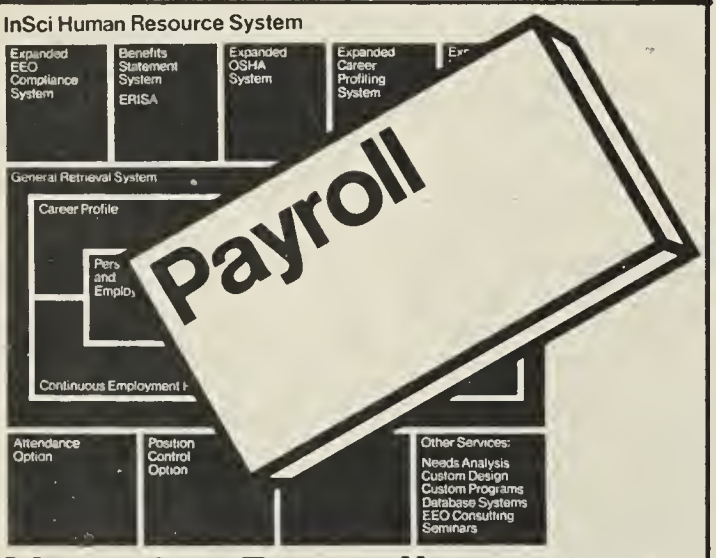

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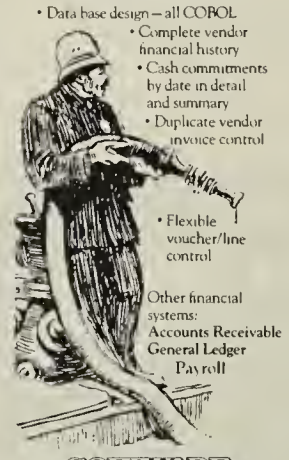

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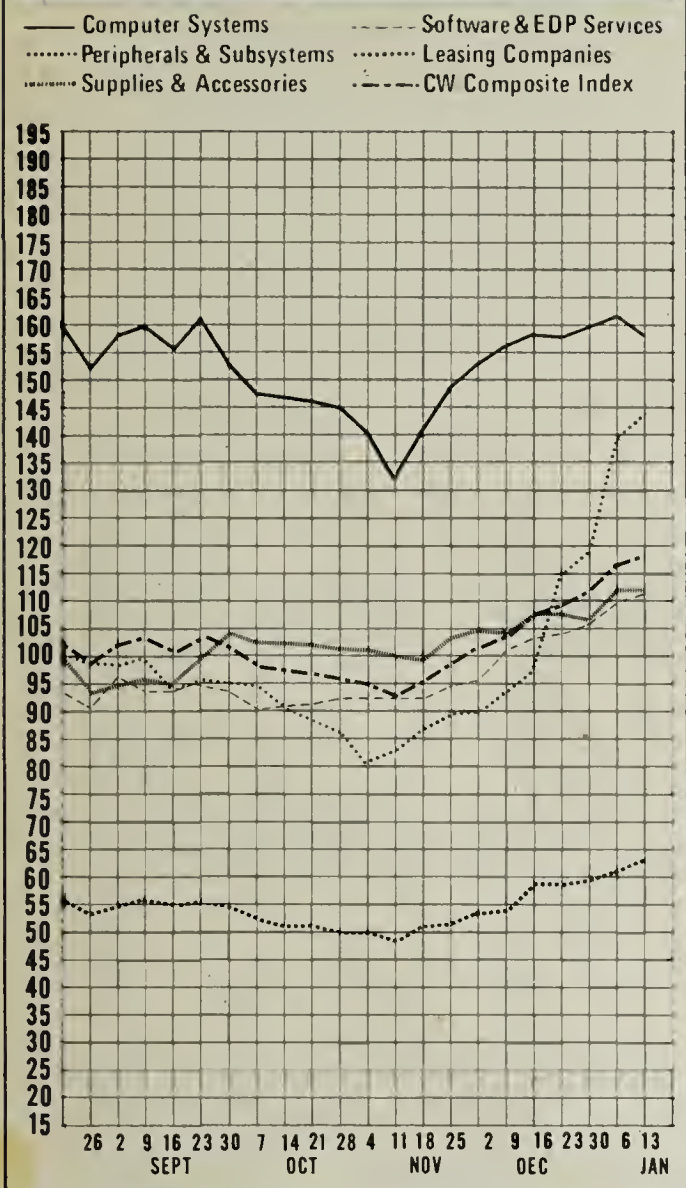

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	1976	1975
Shr Ernd	$.82	$.27
Revenue	10,396,768	8,624,836
Earnings	475,158	156,799

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	1976	1975
Shr Ernd	$.11	$.08
Revenue	24,549,611	20,576,198
Earnings	1,215,039	857,139
9 Mo Shr	.80	.69
Revenue	94,581,905	83,112,010
Earnings	8,783,002	7,594,285

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Three Months Ended Sept. 30

	1976	1975
Shr Ernd	$.05	$.30
Revenue	1,417,000	1,767,000
Tax Cred	.....	172,000
Earnings	82,000	357,000
6 Mo Shr	.19	.66
Revenue	2,915,000	3,650,000
Tax Cred	60,000	370,000
Earnings	266,000	766,000

COMSHARE
Three Months Ended Sept. 30

	1976	1975
Shr Ernd	$.25	$.22
Revenue	3,725,904	3,449,664
Tax Cred	a105,000	148,000
Earnings	346,142	301,800

a-From deduction of prior year's accounting expenses.

CPT
Three Months Ended Sept. 30

	1976	1975
Shr Ernd	$.15	$.14
Revenue	2,483,726	2,233,240
Earnings	192,462	184,607

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Three Months Ended Oct. 1

	1976	1975
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6 Mo Shr	.....	.....
Revenue	14,954,000	14,637,000
Loss	115,000	679,000

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TRADE*QUOTES

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, JANUARY 12, 1977

All statistics compiled, computed and formatted by TRADE★QUOTES, INC. Cambridge, Mass. 02139

COMPUTER SYSTEMS

EXCH		1976-77 RANGE (1)	CLOSE JAN 12 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	AMDAHL CORP	23- 40	35	-2	-5.4
N	BURROUGHS CORP	84-108	86 1/4	-1 3/4	-1.9
O	COMPUTER AUTOMATION	10- 20	18 3/8	- 3/8	-2.0
N	CONTROL DATA CORP	18- 27	24 3/4	- 3/8	-1.4
N	DATA GENERAL CORP	40- 60	41 1/4	-2 1/2	-5.7
O	DATAPOINT CORP	24- 46	28 1/4	- 1/4	-0.8
O	DIGITAL COMP CONTROL	2- 7	6 3/8	- 5/8	-8.9
N	DIGITAL EQUIPMENT	46- 60	50 1/2	- 3/4	-1.4
N	ELECTRONIC ASSOC.	2- 5	2 3/4	- 3/8	-12.0
A	ELECTRONIC ENGINEER.	7- 16	9 1/2	+ 1/2	+5.5
O	FOUR-PHASE SYSTEMS	13- 21	16 1/8	- 5/8	-3.7
N	FOXBORO	28- 51	45	-3	-6.2
O	GENERAL AUTOMATION	4- 11	7 3/4	- 3/8	-4.6
O	GRI COMPUTER CORP	1- 1	1/2	0	0.0
N	HEWLETT-PACKARD CO	80-117	79 3/4	-4	-4.7
N	HONEYWELL INC	34- 56	46 1/4	-1	-2.1
N	IBM	227-288	269	-5	-1.8
O	MANAGEMENT ASSIST	1- 9	6 7/8	- 1/8	-1.7
O	MEMOREX	17- 33	23 1/8	-1 5/8	-6.5
O	MICRODATA CORP	10- 28	14 3/4	+ 1/4	+1.7
O	MODULAR COMPUTER SYS	3- 14	5 1/2	- 1/8	-2.2
N	NCR	24- 38	36 1/8	-1 3/4	-4.6
O	PRIME COMPUTER INC	4- 18	16	- 3/4	-4.4
N	PERKIN-ELMER	19- 27	19 1/2	-1 3/8	-6.5
N	RAYTHEON CO	45- 67	57 1/4	0	0.0
N	SPERRY RAND	40- 52	40 1/8	+ 1/8	+0.3
O	SYCOR INC	9- 31	13 1/4	- 3/4	-5.3
A	SYSTEMS ENG. LABS	5- 10	6 1/4	- 1/4	-3.8
N	VARIAN ASSOCIATES	12- 17	15 5/8	+ 5/8	+4.1
A	WANG LABS.	11- 20	14 1/4	- 1/2	-3.3

LEASING COMPANIES

EXCH		1976-77 RANGE (1)	CLOSE JAN 12 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	BOOTHE COMPUTER CORP	1- 8	9 1/4	+1 3/8	+17.4
O	COMDISCO INC	3- 10	9 1/2	0	0.0
A	COMMERCE GROUP CORP	2- 3	2 1/8	0	0.0
A	COMPUTER INVSTRS GRP	1- 3	2	+ 3/8	+23.0
M	DATRONIC RENTAL	1- 8	1 5/8	- 1/8	-7.1
A	DCL INC	1- 1	7/8	0	0.0
N	DPF INC	5- 8	7 3/8	0	0.0
N	ITEL	6- 15	14 1/4	+1 5/8	+12.8
N	LEASCO CORP	6- 21	19 3/4	+ 1/4	+1.2
O	LEASPAC CORP	0- 1	3/4	0	0.0
O	USG INC	0- 1	1/8	0	0.0
A	PIONEER TEX CORP	6- 9	6 1/8	+ 5/8	+8.3
N	U.S. LEASING	7- 12	11	0	0.0

SOFTWARE & EDP SERVICES

EXCH		1976-77 RANGE (1)	CLOSE JAN 12 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	1- 3	1 3/4	+ 1/8	+7.6
O	ANACOMP INC	6- 11	7 1/8	+ 1/8	+1.7
A	APPLIED DATA RES.	2- 7	5 7/8	+ 1/4	+4.4
N	AUTOMATIC DATA PROC	17- 35	28	- 1/2	-1.7
O	COLEMAN AMERICAN COS	2- 6	2 1/4	- 1/8	-5.2
O	COMPU-SERV NETWORK	3- 11	11 1/4	+1 1/2	+15.3
O	COMPUTER DIMENSIONS	3- 7	6 7/8	0	0.0
O	COMP ELECTION SYSTMS	5- 9	7	+1 1/4	+21.7
O	COMPUTER HORIZONS	1- 2	1 1/4	0	0.0
O	COMPUTER NETWORK	2- 8	6 5/8	+ 1/4	+3.9
N	COMPUTER SCIENCES	4- 8	8 1/4	+1	+13.7
O	COMPUTER TASK GROUP	1- 2	1 1/4	0	0.0
O	COMPUTER USAGE	2- 6	2 3/8	0	0.0
O	COMSHARE	2- 9	5	0	0.0
O	DATA DIMENSIONS INC	2- 5	4	- 1/8	-3.0
O	DATATAB	1- 2	1 1/2	0	0.0
N	ELECTRONIC DATA SYS.	12- 18	17 1/8	- 3/8	-2.1
O	INFONATIONAL INC	1- 1	1/8	0	0.0
O	INSYTE CORP	1- 3	2 3/8	+ 1/8	+5.5
C	IPS COMPUTER MARKET.	1- 2	1	0	0.0
O	KEANE ASSOCIATES	2- 4	2 1/4	- 1/4	-10.0
O	KEYDATA CORP	1- 5	1 3/4	0	0.0
A	LOGICON	3- 8	7 1/2	+ 1/4	+3.4
A	MANAGEMENT DATA	1- 3	2	0	0.0
A	NATIONAL CSS INC	13- 25	24 5/8	+1 1/2	+6.4
O	NATIONAL DATA CORP	4- 7	6 1/8	+ 1/8	+2.0
A	ON LINE SYSTEMS INC	17- 23	20 7/8	- 7/8	-4.0
N	PLANNING RESEARCH	3- 5	4	- 1/8	-3.0
O	PROGRAMMING & SYS	1- 1	1/4	0	0.0
O	RAPIDATA INC	2- 5	2 1/2	- 1/8	-4.7
O	REYNOLDS & REYNOLD	13- 21	19 1/4	0	0.0
O	SCIENTIFIC COMPUTERS	1- 1	1 1/8	0	0.0
O	TYMSHARE INC	14- 28	18	-1	-5.2
A	URS SYSTEMS	3- 5	3 7/8	0	0.0
N	WYLY CORP	1- 7	2 1/8	+ 1/8	+6.2

PERIPHERALS & SUBSYSTEMS

EXCH		1976-77 RANGE (1)	CLOSE JAN 12 1977	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADDRESSOGRAPH-MULT	8- 14	13 1/4	-1 1/8	-7.8
O	ADVANCED MEMORY SYS	4- 10	7 7/8	+ 1/8	+1.6
N	AMPEX CORP	5- 10	8 1/4	- 1/8	-1.4
O	ANDERSON JACOBSON	2- 4	3 3/8	- 1/4	-6.8
O	APPLIED DIG DATA SYS	13- 25	14 1/4	0	0.0
O	BEEHIVE MEDICAL ELEC	3- 11	10	- 3/4	-6.9
A	BOLT,BERANEK & NEW	7- 11	7 3/4	+ 1/2	+6.8
N	BUNKER-RAMO	5- 10	8	- 5/8	-7.2
A	CALCOMP	4- 7	5 1/8	+ 3/4	+17.1
O	CAMBRIDGE MEMORIES	0- 6	1 1/4	+ 1/4	+25.0
N	CENTRONICS DATA COMP	20- 36	25 1/4	- 1/4	-0.9
O	CODEX CORP	22- 42	33 1/2	+ 1/2	+1.5
O	COGNITRONICS	1- 1	1	0	0.0
O	COMPUTER COMMUN.	1- 6	6 1/4	+ 1/2	+8.6
O	COMPUTER CONSOLES	4- 7	4 1/2	- 1/2	-10.0
A	COMPUTER EQUIPMENT	1- 3	1 7/8	0	0.0
O	COMPUTER TRANSCEIVER	1- 3	1 1/8	0	0.0
O	COMTEN	4- 11	10	- 5/8	-5.8
N	CONRAC CORP	20- 27	25 1/2	+ 1/2	+2.0
O	DATA ACCESS SYSTEMS	1- 5	4 1/4	0	0.0
O	DATA LOG	6- 13	8	0	0.0
A	DATA PRODUCTS CORP	5- 15	12 1/8	- 1/8	-1.0
O	DATA TECHNOLOGY	1- 3	3 1/4	0	0.0
O	DATUM INC	1- 2	1 3/8	- 3/8	-21.4
O	DECISION DATA COMPUT	1- 4	1 3/4	- 1/8	-6.6
O	DELTA DATA SYSTEMS	1- 1	3/8	0	0.0
N	ELECTRONIC M & M	1- 4	4 1/4	+ 3/4	+21.4
O	FABRI-TEK	1- 1	1	0	0.0
O	GENERAL COMPUTER SYS	0- 2	1/2	0	0.0
N	HAZELTINE CORP	4- 12	10 1/4	+ 7/8	+9.3
N	HARRIS CORP	28- 57	28 1/2	- 1/4	-0.8
A	INCOTERM CORP	9- 20	12 1/4	- 3/4	-5.7
O	INFOREX INC	3- 7	5 3/4	- 1/2	-8.0
O	INFORMATION INTL INC	10- 18	13 5/8	- 1/4	-1.8
O	INTEL CORP	47-109	54	+1	+1.8
A	LUNDY ELECTRONICS	3- 7	4 3/4	+1	+26.6
O	MSI DATA CORP	3- 7	6 1/8	- 1/4	-3.9
N	MILGO ELECTRONICS	15- 22	20 3/4	- 1/8	-0.5
N	MOHAWK DATA SCI	3- 10	6 3/4	+ 3/8	+5.8
O	PENEIL CORP	1- 3	2 1/8	+ 1/8	+6.2
A	PERTEC CORP	3- 8	8 1/4	+ 7/8	+11.8
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
O	PRECISION INST.	2- 10	1 1/2	0	0.0
O	QUANTOR CORP	4- 6	4 3/4	- 1/4	-5.0
O	RECOGNITION EQUIP	6- 11	9 3/8	- 1/4	-2.5
N	SANDERS ASSOCIATES	6- 11	10 1/8	- 7/8	-7.9
O	SCAN DATA	1- 4	1 1/2	0	0.0
O	STORAGE TECHNOLOGY	9- 13	11 1/4	0	0.0
O	T BAR INC	5- 10	7	- 1/4	-3.4
O	TALLY CORP.	4- 6	5 3/8	- 3/8	-6.5
O	TEC INC	3- 9	8	- 3/4	-8.5
N	TEKTRONIX INC	45- 69	63 1/4	-3 1/4	-4.8
N	TELEX	2- 5	2 7/8	0	0.0
O	WANGCO INC	11- 22	17 1/2	0	0.0
O	WILTEK INC	1- 2	3/8	+ 1/4	+200.0

SUPPLIES & ACCESSORIES

EXCH		1976-77 RANGE (1)	CLOSE JAN 12 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED SYSTEMS INC	1- 4	3 1/4	0	0.0
O	BALTIMORE BUS FORMS	3- 5	3 5/8	+ 1/8	+3.5
A	BARRY WRIGHT	6- 11	10 1/2	- 3/8	-3.4
O	CYBERMATICS INC	0- 1	5/8	0	0.0
A	DATA DOCUMENTS	25- 45	44 1/4	0	0.0
O	DIPLEX PRODUCTS INC	13- 24	14 5/8	- 1/4	-1.6
N	ENNIS BUS. FORMS	6- 8	6 1/4	- 3/8	-5.6
O	GRAHAM MAGNETICS	8- 13	11	- 1/4	-2.2
O	GRAPHIC CONTROLS	13- 19	14 3/4	- 1/4	-1.6
N	3M COMPANY	53- 66	54	-1 1/4	-2.2
O	MOORE CORP LTD	32- 51	35	-1 1/4	-3.4
N	NASHUA CORP	11- 20	17 5/8	- 1/4	-1.3
O	STANDARD REGISTER	15- 19	18 1/2	+ 1/4	+1.3
O	TAB PRODUCTS CO	5- 15	14 1/4	+1 1/4	+9.6
N	UARCO	19- 25	21 3/4	- 3/8	-1.6
A	WABASH MAGNETICS	4- 12	11 1/4	+ 1/8	+1.1
N	WALLACE BUS FORMS	19- 25	21	- 1/8	-0.5

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
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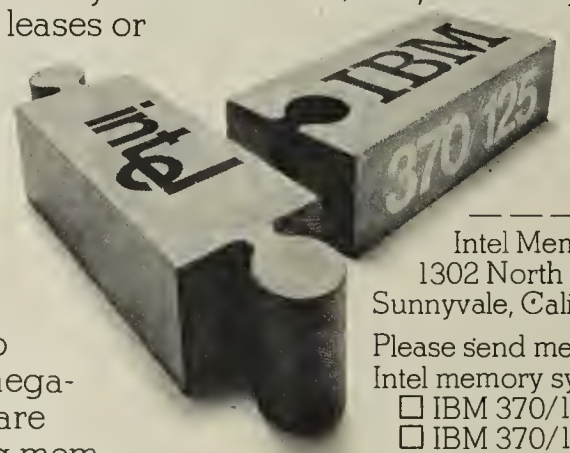

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